

INTERTIDAL AND SHALLOW WATER HYDROIDS FROM FIJI. II. PLUMULARIIDAE AND AGLAOPHENIIDAE

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Nineteen species of Hydroida Plumulariidae and Aglaopheniidae were obtained from intertidal reefs and shallow waters in Fiji. The generic name *Monotheca* Nutting is used for species of *Plumularia* (s. lat.) having a single hydrotheca per hydrocladium, for example, *M. obliqua* (Saunders in Johnston); and *Lytocarpia* Kirchenpauer and *Macrorhynchia* Kirchenpauer are preferred to their better known junior synonyms, respectively *Thecocarpus* Nutting and *Lytocarpus* Allman. *Lytocarpia bathyalis* sp.nov., *L. nicpenni* sp.nov. and *L. vitiensis* sp.nov. are erected. All species are illustrated with line drawings made using a camera lucida, and substantial variability is figured for *Gymnangium eximium* (Allman) and *Lytocarpia phyteuma* (Kirchenpauer). □Hydroida, taxonomy, Pacific, Fiji, coral reefs, intertidal, shallow water.

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This paper constitutes the second and final part of our account of hydroids collected by the first author in Fiji during 1978–80, and deals with the Plumulariidae (in the broad sense). All the non-plumulariid hydroids were described by Gibbons and Ryland (1989) whose account should be consulted for a general introduction and for details of the stations.

SYSTEMATICS

Family PLUMULARIIDAE

Antennella Allman, 1877

A. secundaria (Gmelin, 1791) (Fig. 1)

Sertularia secundaria Gmelin, 1791: 3854

Antennella secundaria (Gmelin, 1791): Millard, 1975: 332; Vervoort and Vasseur, 1977: 64

DESCRIPTION

Colony typically comprising erect, unbranched stems without hydrocladia (but see Variations), reaching 10 mm. Stem consisting of basal athecate and distal hydrotheca-bearing regions. The former of variable length, with one or more transverse nodes proximally; only its distalmost internode bearing mesial

nematothecae; terminated by a hinge joint. Stem thecate distally, with alternate thecate and athecate internodes separated by almost transverse and very oblique nodes respectively. Athecate internodes of variable length, usually longer than thecate internodes; one or two nematothecae; without internodal septa. Thecate internodes with four nematothecae: one medio-inferior, not reaching base of hydrotheca, a pair of laterals which rarely overlap the thecal margin, and one small medio-superior nematotheca in axil immediately behind free adcauline wall of hydrotheca; internodal septa absent.

Hydrothecae cup-shaped, adnate for one-half to two-thirds vertical height, with sides more or less straight and parallel, flaring to margin; or abcauline wall convex in lower region before expanding to margin above; variably thickened. Margin smooth and oblique, at 45–55° to axis. Basal hydrothecae broader and more squat than those distally.

Medio-inferior nematotheca two-chambered but of variable length and mobility; distal chamber scoop-like, adcauline wall much lower than abcauline. Lateral nematothecae pedicellate, arising near top of adnate region of hydrotheca; infundibulariform, the distal chamber broad and shallow, with rim sloping gently mesiad from outer edge. Medio-superior nematotheca of variable size: minute and one-chambered or larger

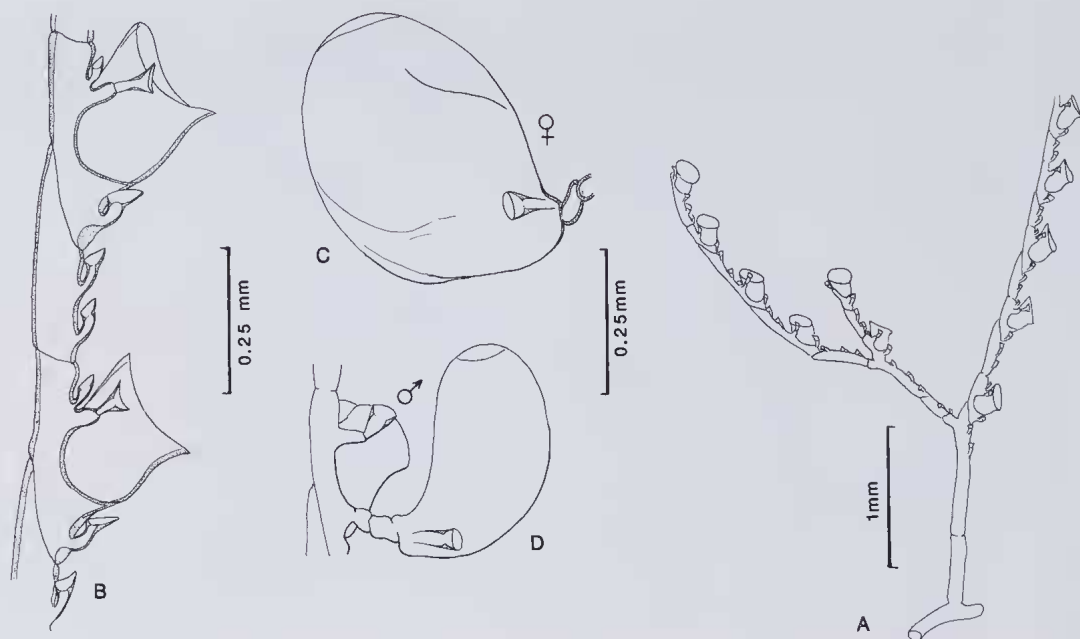


FIG. 1. *Antennella secundaria*. A, part of colony. B, hydrothecae and nematothecae. C, female gonotheca. D, male gonotheca. A,C,D, QMGL10291, Joske's Reef. B, QMGL10292, Great Astrolabe Reef.

and two-chambered, distal chamber with almost non-existent adcauline wall.

Colony hermaphrodite. Gonothecae borne immediately below hydrothecae, often male and female from below same hydrotheca. Both with pedicel of two segments, curved and pear-shaped, tapering proximad and rounded distally, with operculate aperture; bearing 2–3 two-chambered nematothecae basally. Male gonotheca smaller and less truncated distally.

VARIATIONS AND REMARKS

Unbranched colonies are common everywhere around Fiji. However, branched forms, which tend to resemble *Monastaeas quadridens* (McCraday, 1857) in colony structure and helicoid sympodial branching, are also present. In these, an apophysis is present on the posterior surface of the basal athecate internode, immediately below the terminal hinge-joint. This in turn gives rise to another athecate internode of variable length, with a variable number of nematothecae, terminal hinge-joint and posterior apophysis, etc. Each branch, therefore, arises from an apophysis on the posterior surface of the previous one. Colonies with more than four such branches rare; occasional colonies have two hydrocladial apophyses arising at the same level

on the posterior or postero-lateral surface of the basal internode. While *A. secundaria* and *M. quadridens* are very similar, Millard (1975) has pointed out they can be differentiated by examining the main colony axis. If this is formed by the first hydrocladium then the specimen is *A. secundaria*; if it is formed by the bases of successive hydrocladia then *M. quadridens*. Vervoort and Vasseur (1977) have given very good descriptions of the two forms.

MEASUREMENTS (μm)

Measurements for unbranched and branched colonies respectively. Hydrocladium: thecate internode 105–240, 130–170; athecate internode 300–420, 280–410. Hydrotheca: abcauline length 160–190, 140–180; adnate adcauline length 105–145, 135–140; free adcauline length 70–115, 110–125; marginal diameter 165–225, 160–200. Gonotheca (seen only on unbranched colonies; presumed δ and η respectively): vertical height 324–432, 396–450; opercular diameter 72–90, 144–162; maximum width 191–210, 252–238.

OCCURRENCE IN FIJI

Common and widespread, usually under coral boulders, once on *Thyroscyphus fruticosus*;

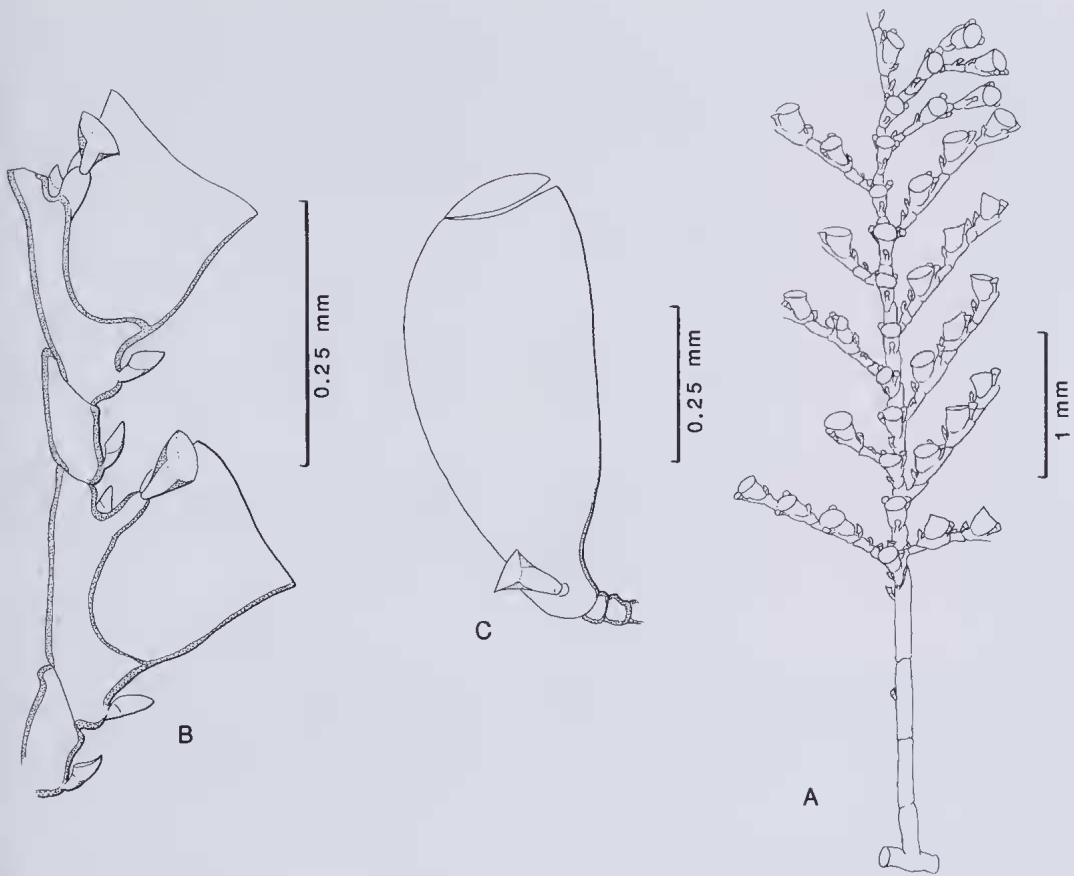


FIG. 2. *Halopteris buskii*. A, part of colony. B, part of hydrocladium. C, gonotheca. QMGL10293, Suva Barrier Reef.

sometimes supporting *Hebella parasitica* (Suva barrier reef). Ndeumba, 20 Aug 78 (BM 1984.5.17.38); with gonothecae 24 Jun 78 and 18 Sep 78 (QM GL10291; BM 1984.5.17.39). Also collected at Tanaea, Tarawa atoll, Kiribati, 11 Feb 79.

WORLD DISTRIBUTION

Cosmopolitan. Type locality: Mediterranean.

Halopteris Allman, 1877

Halopteris buskii (Bale, 1884)
(Fig. 2)

Plumularia buskii Bale, 1884: 125

Plumularia buskii: Billard, 1913: 21

Heterotheca buskii (Bale): Hirohito, 1974: 30

Halopteris buskii (Bale, 1884): Vervoort and Vasseur, 1977: 72

DESCRIPTION

Colony with erect stems arising from a hydro-rhiza, reaching 9 mm; consisting of basal athe-cate and distal thecate, hydrocladia-bearing parts, the two separated by a hinge-joint. Proximal part may be subdivided by transverse nodes; uppermost internode bearing anterior nematothecac in two longitudinal series. Distal part divided by oblique hinge-like nodes into thecate internodes, each with one hydrotheca and up to six nematothecae: one medio-inferior, one or two pairs lateral, and up to three medio-superior, in two longitudinal series (either alter-nate or opposite each other). One or two pairs of subopposite hydrocladia arising on short apophyses from sides of first one or two cauline hydrothecae; thereafter, arrangement alternate, one hydrocladium per internode. An athe-cate internode may occur immediately above a hydrotheca, in which case bearing one or more

of the superior nematothecae from internode below.

Hydrocladia, bearing hydrothecae on upper surface, consisting first of a short athecate internode without nematothecae and septa, terminated by slightly oblique node; thereafter athecate and thecate internodes alternate, their terminal nodes respectively oblique and almost transverse. Thecate internodes 1.5–2 times length of athecate internodes, without septa; with four nematothecae: one medio-inferior, one pair lateral, and one medio-superior, small, in the axil immediately behind free adcauline wall of hydrotheca. Athecate internodes without septa, with one nematotheca.

Hydrothecac cup shaped, taller than wide, adnate for one-third to one-half of vertical height, with walls almost straight, flaring slightly to margin; adcauline edge of margin approximately one-half way up distal athecate internode; without intrathecal septum. Margin oblique, 45–55° to axis.

Medio-inferior nematothecae rarely reaching base of hydrotheca: two-chambered and immovable, distal chamber short and scoop-like, without adcauline wall, proximal chamber not sharply demarcated from internode. Lateral nematothecae on finger-like pedicel, reaching more or less to thecal margin, two-chambered and movable, narrowly obconical with distal chamber shallow, broad and often quite deeply emarginated on mesial side. Medio-superior nematotheca small but distinctly two-chambered; distal chamber without adcauline wall.

Gonothecae on stem, immediately below hydrothecae; on pedicel of two segments; elongate and pear-shaped, curving upwards; with two two-chambered nematothecae near base. Aperture circular, broad and operculate.

MEASUREMENTS (µm)

Measurements made on BM1988.11.10.6–7 and QM GL10293 respectively. Stem: internode length 360–380, 265–325. Hydrocladium: thecate internode 190–240, 175–230; athecate internode 130–140, 100–150. Hydrotheca: abcauline length 175–210, 150–180; adnate adcauline length 140–160, 140–160; free adcauline length 100–130, 100–120; marginal diameter 160–180, 160–185. Gonotheca (presumed ♂ and ♀ respectively): opercular diameter 45–54, 162–234; vertical height 450–612, 558–738; maximum width 216–234, 252–360.

VARIATIONS

A second pair of lateral nematothecae may be present per cauline hydrotheca, mesial to and much smaller than normal pair. Likewise on the hydrocladium, two medio-superior nematothecae are often present behind the free adcauline wall of the hydrotheca.

REMARKS

See Remarks under *H. polymorpha*.

OCCURRENCE IN FIJI

Suva barrier reef, 7 Jul 78 (QMGL10293; BM 1984.5.17.40); Joske's reef, on coral rock, with gonothecae, 18 Sep 78.

WORLD DISTRIBUTION

Eastern Indian Ocean and western Pacific, north to Japan (Sagami Bay, Honshu), south to Great Barrier Reef.

Halopteris diaphana (Heller, 1868)

(Fig. 3)

Anisocalyx diaphana Heller, 1868: 42

Plumularia diaphana (Heller): Fraser, 1944: 342

Antennella diaphana diaphana (Heller, 1868): van

Gemerden-Hoogeveen, 1965: 49

Halopteris diaphana diaphana (Heller, 1868): Ver-voort, 1968: 58

DESCRIPTION

Colony comprising erect stems arising from creeping hydrorhiza; stems reaching 21 mm; athecate basally, thecate and pinnate distally; the two regions separated by a very oblique hinge-type node. Basal internodes of variable length, with up to five transverse, slightly annulated nodes; uppermost internode bearing a number of irregularly arranged nematothecae. Distal part divided by oblique nodes into thecate internodes, each with one hydrotheca near base and up to five nematothecae: one medio-inferior, one pair lateral, and one or two medio-superior. First pair or two pairs of hydrocladia subopposite, arising from short apophyses at sides of first one or two hydrothecae; thereafter, strictly alternating, one per internode. Extra short, athecate internodes may occur sporadically, these having a basal transverse node and single nematotheca.

Hydrocladia with hydrothecac on upper surface; consisting, first, of a very short athecate internode, without nematothecae or septa, terminated by an oblique node; thereafter, athecate and thecate internodes alternate, terminated respectively by oblique and transverse nodes.

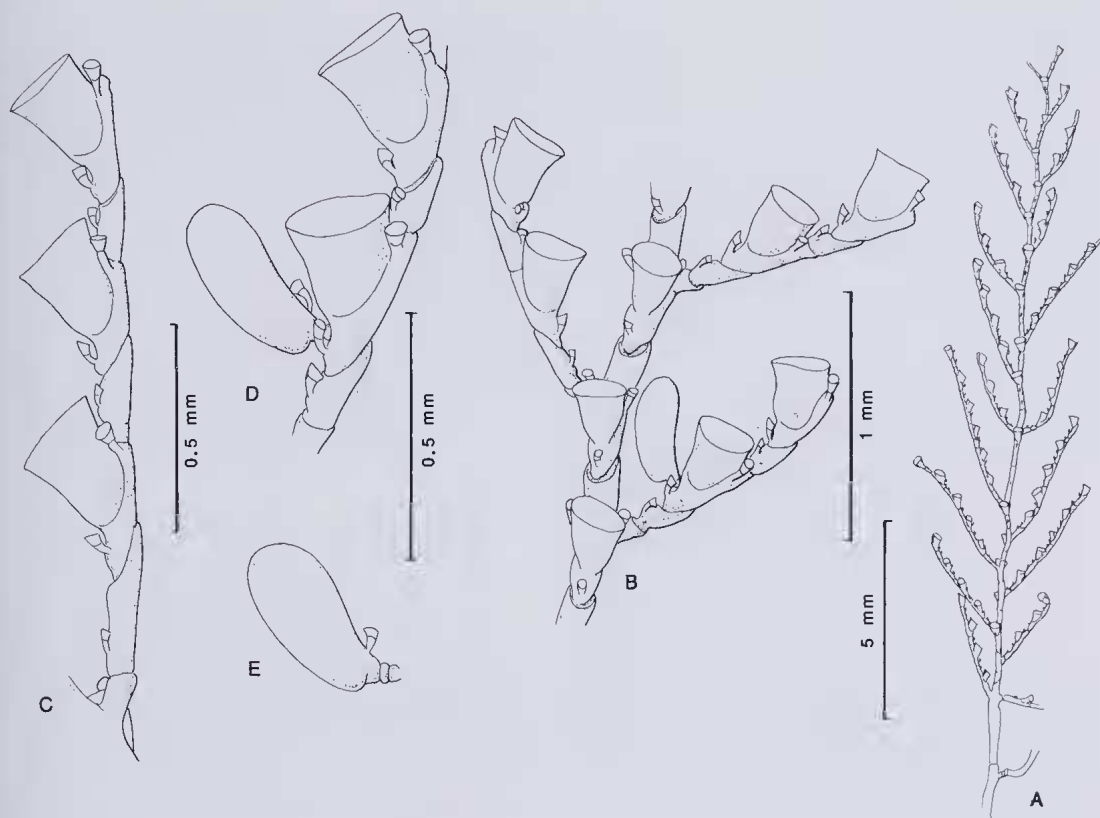


FIG. 3. *Halopteris diaphana*. A, part of colony. B, part of stem and hydrocladia. C, hydrocladium in profile. D, gonothecha from B. E, gonothecha. A, QMGL10294, Mba. B-D, QMGL10295, Joske's Reef.

Athecate internodes typically longer than thecate, without septa but each with a proximal nematotheca. Thecate internodes with three nematothecae: one medio-inferior, one pair lateral; also without septa.

Hydrothecae cup-shaped, taller than wide, adnate for one-half to two-thirds of vertical height, with walls more or less straight, flaring slightly to margin, without intrathecal septum. Margin oblique, at $45-50^\circ$ to axis.

Medio-inferior nematotheca never reaching base of hydrotheca; immovable, two-chambered; distal chamber short and scoop-like, without adcauline wall. Lateral nematothecae shortly pedicellate, rarely reaching or overtopping thecal margin; movable and two-chambered; distal chamber obconical, the mesial side slightly lower than outer.

Gonothecae (in our material probably immature male) on hydrocladia, each immediately below a hydrotheca; shortly cylindrical; on pedicel of two segments; curving upward, taper-

ing proximad and truncated or, more normally, rounded distally. Aperture small and operculate; one two-chambered nematotheca near the base.

MEASUREMENTS (μm)

Stem: internode length 430–700. Hydrocladia: thecate internode length 160–225; athecate internode length 170–325. Hydrothecae: abcauline length 200–225; adnate adcauline length 180–210; free adcauline length 75–115; marginal diameter 190–210. Gonothecae (? immature male): length 324–346; maximum width 144–162.

VARIATIONS

Branched colonies rare; branches of same structure as main stem, athecate proximally, with hydrothecae and hydrocladia distally, arising from short apophyses on basal part of stem. In some colonies, especially the fertile material from Joske's Reef, athecate internodes of

hydrocladia are not longer than thecate internodes.

REMARKS

This species appears variable in internode length, and arrangement and structure of nematothecae. Caribbean material has been described by van Gernerden-Hoogveen (1965) and Vervoort (1968). Most of our specimens agree with those of van Gernerden-Hoogveen in having long athecate internodes on the hydrocladia. However, they lack the superior nematotheca in the axil immediately behind the free adcauline wall of the hydrotheca, and the lateral nematothecae do not have such scoop-like distal chambers; in these respects our material resembles that described by Vervoort (1968) from Puerto-Colombia, except that he recognized a nematotheca in the axil of the hydrocladium, absent from our specimens. Other of our material, from Joske's Reef, has short athecate internodes and agrees very well with Vervoort's (1968) description, apart from the absence of a nematotheca in the hydrocladial axil. No axillary nematotheca was indicated by Nutting (1900) in West Indian material (as *Plumularia alternata* Nutting, 1900) though one was later described by Fraser (1944). When identifying this as *H. diaphana*, we have taken account of the great variability (we have been comparing Pacific and Atlantic material) apparently exhibited by this species: the regular thecate cauline internodes have been useful to separate this species from *H. constricta* Totton, 1930, with which it might otherwise be confused.

OCCURRENCE IN FIJI

Yarawa reef, off Mba, under boulder, 8 Jul 78 (QM GL10294; BM 1984.5.17.41); reproductive, Joske's Reef, 18 Sep 78 (QM GL10295).

WORLD DISTRIBUTION

Widely distributed in tropical and warm temperate waters.

Halopteris polymorpha (Billard, 1913) (Fig. 4)

Plumularia polymorpha Billard, 1913: 24

Halopteris polymorpha (Billard, 1913): Millard, 1975: 354

DESCRIPTION

Colony comprising erect stems arising from a creeping hydrorhiza; stem reaching 12.5 mm;

consisting of basal athecate and distal thecate, hydrocladia-bearing parts: the two separated by an oblique joint. Basal part variable in length, entire or subdivided proximally by one or more transverse nodes; the uppermost internode bearing anterior nematothecae in two longitudinal series. Distal part divided by oblique nodes into thecate internodes, each with a hydrotheca basally and up to eight nematothecae: one medio-inferior, one pair lateral and up to five medio-superior, in two longitudinal series. One or two pairs of opposite hydrocladia arising from short apophyses at sides of the first one or two hydrothecae; thereafter hydrocladia alternate, one per internode. Cauline internodes may incorporate a distal transverse node, forming an athecate internode bearing most of the superior nematothecae.

Hydrocladia consisting first of a short athecate internode lacking nematothecae and internodal septa, terminated by a more or less transverse node; thereafter, athecate and thecate internodes alternate, ended respectively by oblique and transverse nodes. Atecate internodes much the longer, without septa but with up to three mesial nematothecae. Thecate internodes also without internodal septa and generally with three nematothecae: one medio-inferior, not reaching base of hydrotheca, and a lateral pair, more or less reaching (but not overtopping) the thecal margin.

Hydrothecae cup-shaped, squat and shallow, adnate for between one-half to two-thirds of vertical height; with walls more or less straight, widening gradually to margin; not flared. Without intrathecal septum. Margin at 45–50° to axis.

Medio-inferior nematotheca two-chambered: proximal chamber long and probably immovable, distal one short and scoop-like, without an adcauline wall. Lateral nematothecae on short, finger-like pedicel: two-chambered and movable, obconical, with distal chamber shallow, broad, and only slightly emarginate on mesial side.

Gonothecae (probably female) on stem, each immediately below a hydrotheca: pyriform-ovoid, on pedicel of one segment, curving upwards, tapering proximad and rounded distally; with two two-chambered nematothecae near base. Aperture circular and operculate.

VARIATIONS

The hydrocladial hydrothecae may have a minute one-chambered medio-superior

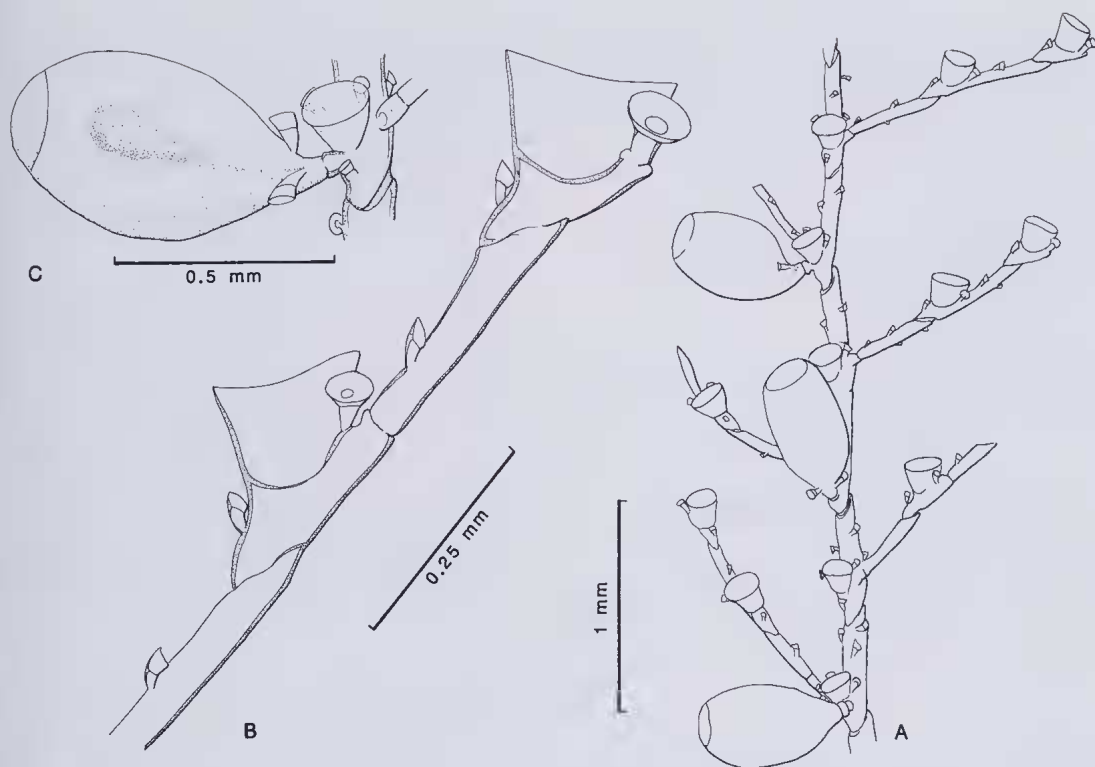


FIG. 4. *Halopteris polymorpha*. A, part of stem with hydrocladia. B, hydrothecae and nematothecae. C, gonotheca. QMGL10296, Suva Barrier Reef.

nematotheca located immediately behind the free adcauline wall.

MEASUREMENTS (μm)

Measurements are from QM GL10296 and Siboga Sta. 80 (Billard, 1913) respectively. Stem: internode length 475–570, -. Hydrocladia: thecate internode 140–200, 340–380; athecate internode 230–280, 380–470. Hydrotheca: abcauline length 110–140, 135–160; adnate adcauline length 135–150, -; free adcauline length 75–90, -; marginal diameter 175–220, 200–215. Gonotheca (probably female): length -, 594–720; maximum diameter -, 342–414; opercular diameter -, 216–234.

REMARKS

Both *H. buskii* (Billard, 1913; Vervoort and Vasseur, 1977) and *H. polymorpha* (Billard, 1913; Millard, 1975) are extremely variable in terms of internode length, shape and size of hydrothecae, and number, arrangement and structure of nematothecae. Moreover, they resemble each other very closely. Our specimens

of *H. buskii* have shorter internodes than previously described and do not have the abcauline "marginal tooth" depicted by Vervoort and Vasseur. In terms of nematothecal arrangement they resemble those described by Billard (1913) and Hirohito (1974) in often having two pairs of lateral nematothecae; their structure, however, differs from Billard's description in that the distal chamber is not goblet-like and deeply emarginate, yet it is not deep and even rimmed as shown by Vervoort and Vasseur (1977, fig. 30C). Ours are broad and shallow but show definite, though gradual, mesial emargination. In identifying our material as *H. polymorpha* we have been influenced by Billard's description of specimens from Siboga Sta. 80 (1913, fig. 14A) in terms of cup shape and relative internode lengths and by the fact that gonothecae have a one-segment pedicel, while those of *H. buskii* have two segments. The lateral nematothecae, used by Billard to separate the two species, are too variable to provide a good diagnostic character. No record of a two-chambered medio-su-

perior nematotheca, axillary to a hydrotheca, has yet been made for *H. polymorpha*; they are always minute and single chambered (cf. *H. buskii*). It seems to us that these two nominal species require comprehensive investigation.

OCCURRENCE IN FIJI

Among sponge, forereef slope, Suva barrier reef, 0–20 m, with gonothecae, 19 Feb 80 (QM GL10296).

WORLD DISTRIBUTION

Red Sea, Africa, Seychelles, Indonesia (Borneo Bank, Rotti), New Caledonia.

Plumularia Lamarck, 1816

Plumularia habereri Stechow, 1909 (Fig. 5)

Plumularia Habereri Stechow, 1909: 77

Plumularia habereri Stechow (1909): Billard, 1913: 42

Plumularia habereri Stechow, 1909: van Gernerden-Hoogeveen, 1965: 60

DESCRIPTION

Colony comprising erect stems arising from a mass of hydrorhizal fibres; stems thick, polysiphonic; reaching 82 mm; branching alternate and in one plane distally, though irregular and in many planes basally (branches arising from both peripheral and axial tubes of stem). Branches polysiphonic to a variable degree basally but monosiphonic distally. Axial tubes of stem and branches divided by slightly oblique nodes into internodes of irregular length, each with a variable number of alternate hydrocladial apophyses and nematothecae. Apophyses borne laterally, each typically with two latero-axillary nematothecae and one small mamelon on upper surface; occasionally also a superior nematotheca. In the polysiphonic region of stem and branches, irregularly scattered nematothecae occur on peripheral tubes.

Hydrocladia typically divided into regular thecate internodes by slightly oblique nodes; hydrothecae on upper surface. No basal athecate internode. Distal region of thecate internodes occasionally (especially distally) cut off by partial or complete nodes into one or more short athecate internodes; these without nematothecae but with an internal, peg-like thickening of the perisarc, on the hydrothecal side, which may develop into a septum. Thecate internodes with three nematothecae: one medio-inferior on a

prominent swelling, not reaching base of hydrotheca, and two lateral on indistinct projections, overtopping the thecal margin. Typically without internodal septa but with up to five perisarcal pegs on the hydrothecal side capable of so developing: two pegs basally (one below and one above papilla of medio-inferior nematotheca), one distally, and one or two in between.

Hydrothecae adnate for more or less entire vertical height, tubular, widening a little to margin; abcauline wall more or less parallel to hydrocladial axis, the margin orthogonal to it. Intrathecal septum absent.

Nematothecae all two-chambered, movable; distal chamber nearly as deep as proximal one, funnel-shaped and slightly emarginate on mesial or adcauline side; not scoop-like.

Gonothecae not observed; described as bag-shaped, smooth, tapering proximally and rounded distally; borne at base of hydrocladium (Stechow, 1909).

MEASUREMENTS (μm)

Stem: internode length 380–1240. Hydrocladium: internode length 270–360. Hydrotheca: marginal diameter 70–85; abcauline height 155–195; adnate adcauline wall 140–165; free adcauline wall 10–25.

VARIATIONS

The hydrothecae at the base of hydrocladia are usually shorter and wider than those distally. The athecate internodes occurring sporadically along the hydrocladium rarely bear a nematotheca.

REMARKS

This species has been redescribed in many varieties by Billard (1913) and van Gernerden-Hoogeveen (1965). Our material does not agree with the latter's description of that from the Caribbean in that it lacks the short adcauline intrathecal septum at the base of the lateral nematothecae and, moreover, the adcauline cup margin is not developed into upwardly pointing cusps. Of the forms designated by Billard, f. *subarmata* and f. *mediolineata* can be eliminated on account of their excessive development of internodal septa, the broad internodes, and ovoid hydrothecae; the latter form also has an abcauline intrathecal peg; f. *mucronata* has too few internodal septa, and the lateral nematothecae are in distinct cup-like embayments; however, the medio-inferior nematotheca is supported on a prominent basal swelling. The differences between f. *attenuata* and f. *elongata* are less clear

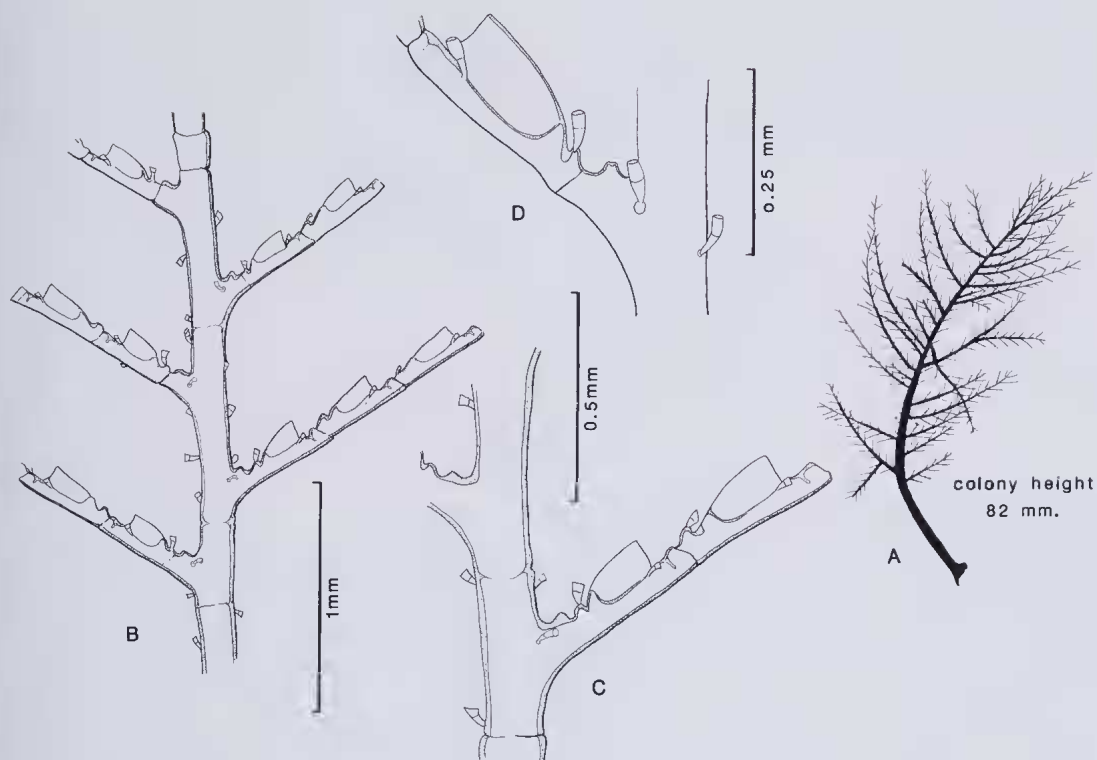


FIG. 5. *Plumularia habereri*. A, colony. B, part of stem with hydrocladia. C, part of B, enlarged. D, hydrotheca and nematothecae, further enlarged. QMGL10297, Great Astrolabe Reef.

and, though both are illustrated as having numerous internodal septa, a note was made of their absence in younger colonies. In our material the hydrothecae do not narrow distad and the margin is not angled as in *f. elongata*. *F. attenuata* was described as being much shorter and perhaps therefore younger than our material, but it still showed internodal septa. Differences shown by our material are insufficient to warrant a new form, so we assign it to *f. attenuata*.

OCCURRENCE IN FIJI

Herald Pass, Great Astrolabe reef, 27 m, 24 Jun 78 (QM GL10297; BM 1984.5.17.42).

WORLD DISTRIBUTION

Japan (Sagami Bay), Indonesia, Caribbean (Curaçao).

***Plumularia pennycuikae* Millard and Bouillon, 1973 (Fig. 6)**

Plumularia sp. Pennycuik, 1959: 183

Plumularia pennycuikae Millard and Bouillon, 1973: 85

Plumularia pennycuikae Millard and Bouillon, 1973: Millard, 1975: 398

DESCRIPTION

Colony comprising erect stems arising from stolonate hydrorhiza; stems monosiphonic, reaching 8.5 mm, unbranched but bearing alternate hydrocladia in one plane; basal part without hydrocladia or nematothecae, very short and subdivided proximally by one or more transverse nodes, without nematothecae. Thereafter, stem divided by transverse nodes into regular internodes, each bearing one long hydrocladial apophysis distally and up to four nematothecae: two axillary (one anterior, one posterior), one inferior and one inferior-opposite; a small mamelon present on the upper surface of the apophysis. Internodal septa absent.

Hydrocladia, bearing hydrothecae on upper surface, consisting first of a short basal athecate internode, lacking nematothecae but with proximal and distal internodal septa, terminated by a very oblique hinge-like joint. Thereafter,

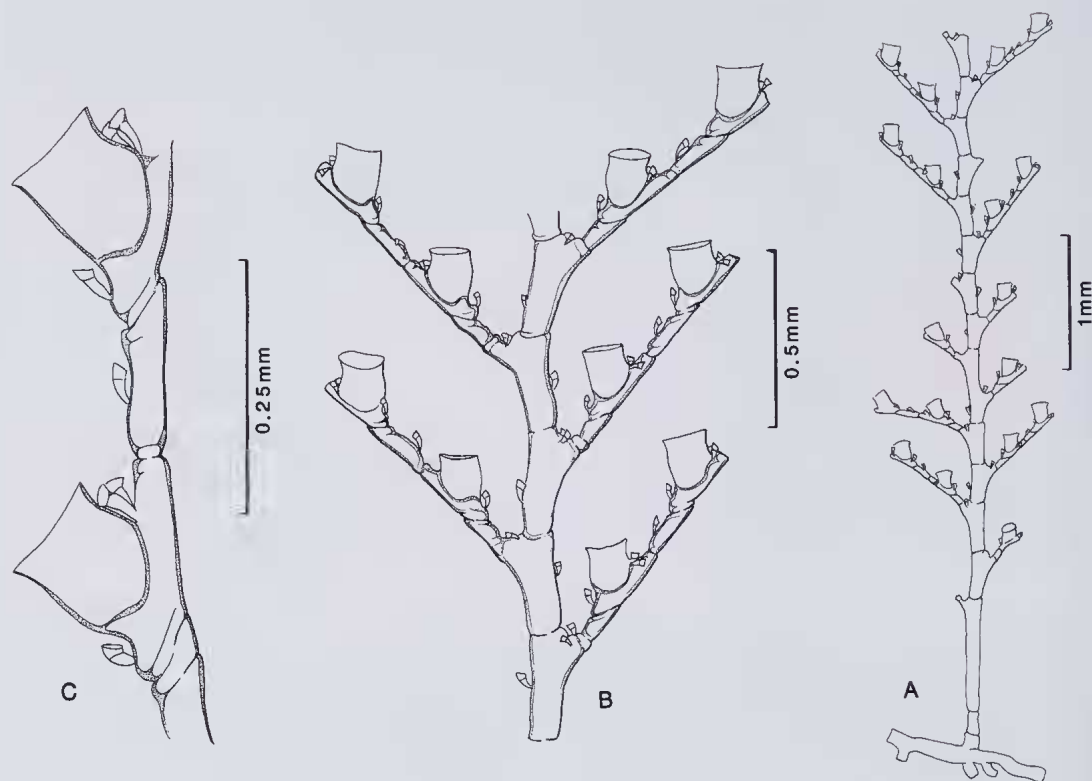


FIG. 6. *Plumularia pennycuikae*. A, part of colony. B, part of stem and hydrocladia. C, part of hydrocladium in profile. QMGL10298, Ngaloa.

thecate and athecate internodes alternate, terminated respectively by transverse and oblique nodes. Athecate internodes shorter and with one nematotheca at mid-length; usually with proximal and distal internodal septa, though these may be represented by internal peg-like thickenings of the perisarc of the upper wall. Thecate internodes with three nematothecae: one medio-inferior, reaching about to the base of hydrotheca, and one pair lateral, not overtopping thecal margin; septa present or not.

Hydrothecae cup-shaped, adnate for approximately one-half vertical height; abcauline wall straight and free; adcauline wall concave, flared to margin; intrathecal septum absent. Margin at $45\text{--}60^\circ$ to hydrocladial axis.

All nematothecae two-chambered and movable. Medio-inferior and cauline nematothecae each with long proximal chamber and short, scoop-like distal one. Lateral nematothecae not

on finger-like process; with shallow, broad distal chamber, slightly lower on mesial side.

Gonothecae not observed but female ovoid to spherical and bearing one egg, borne on hydrocladial apophyses of stem (Millard, 1975); male unknown.

MEASUREMENTS (μm)

Stem: internode length 225–275. Hydrocladia: thecate internode 165–180; athecate internode 125–175. Hydrothecae: abcauline length 115–125; adnate adcauline length 90–116; free adcauline length 60–85; marginal diameter 115–120.

VARIATIONS

Some specimens have been observed to have the first one or two basal internodes with opposite hydrocladia.

OCCURRENCE IN FIJI

Ngaloa, on coral rock, 15 Jun 79 (QM GL10298).

WORLD DISTRIBUTION

Southern Africa, Seychelles, Great Barrier Reef (various localities).

***Plumularia strictocarpa* Pictet, 1893**
(Fig. 7)

Plumularia strictocarpa Pictet, 1893: 55

Plumularia strictocarpa Pictet (1893): Billard, 1913: 34

Plumularia strictocarpa Pictet, 1893: Millard, 1975: 402

DESCRIPTION

Colony consisting of erect stems arising from stolonate hydrorhiza. Stems monosiphonic, reaching 14 mm, unbranched but bearing alternate hydrocladia; basal part short, without hydrocladia or nematothecae. Thereafter, divided by oblique nodes into regular internodes, each bearing a short, antero-lateral hydrocladial apophysis distally, and up to three nematothecae: one axillary, one or two inferior-opposite; a small mamelon on the upper surface of the apophysis. Internodal septa absent.

Hydrocladia, bearing hydrothecae on upper surface, consisting of a short basal athecate internode, without nematothecae but with one septum, terminated by a very oblique joint. Thereafter, thecate and athecate internodes alternate, terminated respectively by transverse and oblique nodes. Relative lengths of these internodes variable. Atecate internodes with one nematotheca and proximal and distal septa. Thecate internodes with three nematothecae, one medio-inferior, never reaching base of hydrotheca, and one pair lateral, usually overtopping thecal margin. Two or three internodal septa present; proximal, distal, and occasionally a third at base of lateral nematothecae.

Hydrothecae adnate for entire vertical height, cup-shaped, neither flared nor narrowed to margin, abcauline wall more or less straight. Margin at 50–70° to hydrocladial axis. Intrathecal septum absent.

All nematothecae two-chambered and movable. Medio-inferior and cauline nematothecae with long proximal chamber and shorter distal one, with latter lower on adcauline side but not scoop-like. Lateral nematothecae on finger-like

process, with shallow, broad, even rimmed, distal chamber.

Gonothecae borne below hydrocladial apophyses near colony base, distinctly annulated, barrel-shaped, often curved, narrowing slightly distad; aperture on a short collar.

MEASUREMENTS (μm)

Stem: internode length 320–390. Hydrocladia: thecate internode 240–280; athecate internode 85–170. Hydrothecae: abcauline length 80–95; adnate adcauline length 75–90; marginal diameter 95–100. Gonotheca: length 684–882; opercular diameter 234–342.

REMARKS

In the absence of gonothecae, this species would be impossible to distinguish from *P. setacea* (Linnaeus, 1758) and *P. warreni* Stechow, 1919. Since much of the material found on Fiji was in non-reproductive condition, and distributions of the three species overlap, it would be meaningless to discuss variability. However, since *P. setacea* and *P. warreni* are likely to occur around Fiji we mention the differences relating to gonothecae. In contrast to *P. strictocarpa*, the gonothecae of both the other species are dimorphic. In *P. setacea* from the British Isles (the material upon which the species is based was collected by Ellis (1755) in S.E. England) male gonangia occur below the female gonangia on the same stem but in smaller numbers (Cornelius and Ryland, 1990). Whether through variability over a wide geographical range or perhaps because another species has become involved, the *P. setacea* described by Millard (1975) from South Africa is gonochoric. *P. warreni* is also gonochoric. The planulae of *P. setacea* develop within the gonothecae, while those of *P. warreni* complete their development in external marsupia. The male gonotheca of *P. setacea* is slender, smooth, with a small aperture; that of *P. warreni* is often slightly curved, smooth or with a vaguely irregular outline: these may not provide reliable separation. The female gonotheca of *P. setacea* is compressed, smooth, with a large aperture supported on a tubular neck, which may be curved slightly to one side. That of *P. warreni* is elongate, ovoid, with a smooth or slightly irregular outline, without a neck. In *P. warreni* var. *pambanensis* Gravelly, 1927, from the Great Barrier Reef (Pennycuik, 1959; JSR, pers. obs. at Heron I.) both male and female gonothecae are cylindrical and the planulae develop in external marsupia.

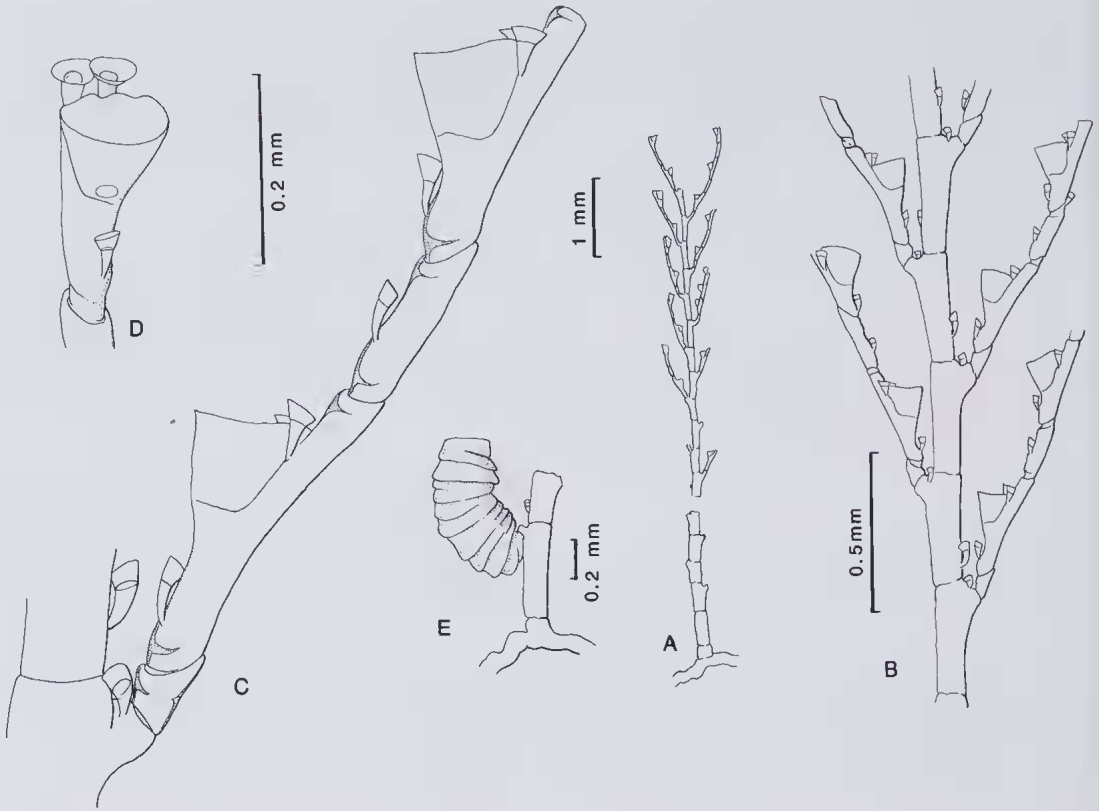


FIG. 7. *Plumularia strictocarpa*. A, part of colony. B, part of stem and hydrocladia. C, basal portion of hydrocladium in profile. D, hydrotheca and nematothecae. E, gonotheca. QMGL10299, Great Astrolabe Reef.

OCCURRENCE IN FIJI

On coral rock, windward Great Astrolabe Reef, with gonothecae, 24 Jun 78 (QMGL 10299). A non-fertile *Plumularia* from Joske's reef, 18 Sep 78, and other collections from the Great Astrolabe, cannot with certainty be assigned to this species.

WORLD DISTRIBUTION

Warm water cosmopolitan.

Plumularia strobilophora Billard, 1913 (Fig. 8)

Plumularia strobilophora Billard, 1913: 35

Plumularia strobilophora Billard, 1913: Vervoort and Vasseur, 1977: 79

DESCRIPTION

Colony consisting of erect stems arising from stolonate hydrorhiza. Stems monosiphonic, reaching 10 mm, unbranched but bearing alter-

nate hydrocladia; basal part as remainder, with hydrocladia and nematothecae. Stem divided by transverse or slightly oblique nodes into regular internodes, each bearing a short, distal hydrocladial apophysis without mamelon but with up to four nematothecae: one inferior-opposite (to the apophysis), two latero-axillary, and one on the upper surface of the apophysis. Internodal septa absent.

Hydrocladia with hydrothecae on upper surface, consisting of a short basal athecate internode, without nematothecae but with proximal and distal internodal septa (all the hydrocladial internodes similar). Thereafter, thecate and athecate internodes alternate, terminated respectively by transverse and oblique nodes. Atecate internodes longer than thecate, and bearing midway one or two nematothecae. Thecate internodes with three nematothecae: one medio-inferior, not reaching to base of hydrotheca, and one pair lateral, at base of free adcauline wall, overtopping thecal margin.

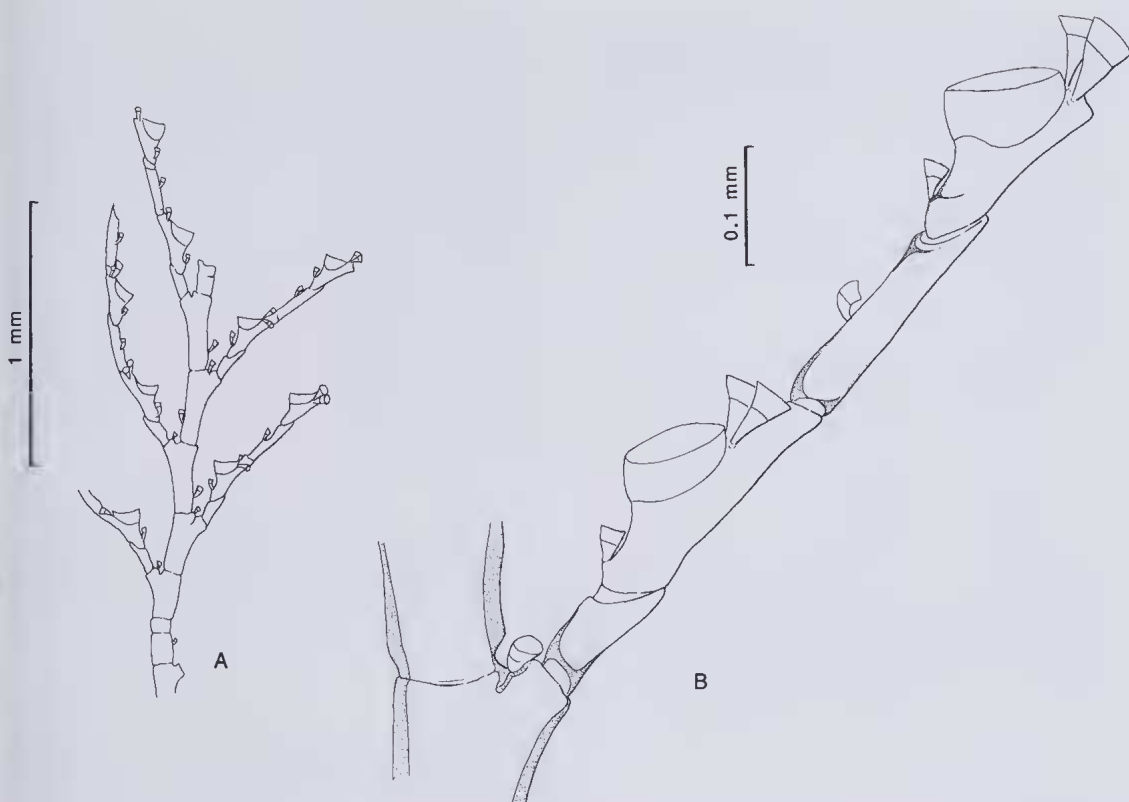


FIG. 8. *Plumularia strobilophora*. A, part of stem with hydrocladia. B, basal portion of hydrocladium in profile. QMGL10300, Great Astrolabe Reef.

Hydrothecae shallow; marginal diameter one and one-half to two times abcauline depth; nearly completely adnate, with very short free adcauline wall and straight abcauline wall. Margin oblique, at $55\text{--}60^\circ$ to hydrocladial axis. Intrathecal septum absent.

All nematothecae two-chambered and movable. Medio-inferior and cauline nematothecae with long proximal and shorter distal chambers, the latter slightly lower on adcauline margin but not scoop-like. Lateral nematothecae obconical, rim of distal chamber more or less even.

Gonothecae not observed; but inserted in the axil of hydrocladia, conical with a truncated distal end (Billard, 1913).

MEASUREMENTS (μm)

Stem: internode length 220–285. Hydrocladia: thecate internode 160–190; athecate internode 220–230. Hydrothecae: abcauline length 25–50; adnate adcauline length 90–100; free adcauline length 15–20; marginal diameter 90–100.

VARIATIONS

Hydrocladia and stem frequently with renovated nodes; these producing short athecate internodes which tend to occur singly on hydrocladia but in succession on the stem: they may or may not have a nematotheca. The number of nematothecae in the hydrocladial axil is variable, apparently because of damage: their former presence is commonly indicated by a small pore in the perisarc. Internodal septa likewise of variable occurrence; if not observed then replaced by internal perisarc thickening of the abcauline wall.

REMARKS

Our material differs somewhat from previous descriptions. The athecate are longer than the thecate internodes, agreeing with Vervoort and Vasseur (1977) but not with Billard (1913); however, as in other species, internode length is very variable. The lack of an observable mamelon on the upper surface of the apophysis accords with Billard, as does the non-conical structure of the

medio-inferior and cauline nematothecae. The hydrothecae, however, tend to be much broader than previously noted, at least eliminating possible confusion with *P. setacea* (Linnaeus, 1758).

OCCURRENCE IN FIJI

On coral boulder, windward Great Astrolabe reef, 24 Jun 78 (QMGL10300).

WORLD DISTRIBUTION

Gulf of Suez, Malay Archipelago, French Polynesia; also Trinidad (Vannucci, 1951).

Monothecha Nutting, 1900

M. obliqua (Saunders in Johnston, 1847)
(Fig. 9)

Minute Sertularia: Lister 1834: 372, pl. 8, fig. 5
Laomedea obliqua Saunders: Johnston, 1847: 106
Plumularia obliqua Saunders: Hincks, 1868: 304
Plumularia obliqua (Johnston, 1847): Millard, 1975: 396

Monothecha obliqua (Saunders in Johnston): Cornelius and Ryland, 1990: 152

DESCRIPTION

Colony consisting of delicate stems arising from a thicker stolonate hydrorhiza. Stems monosiphonic, reaching 3 mm; unbranched but bearing alternate hydrocladia in one plane; divided by transverse or slightly oblique nodes into regular internodes, each bearing a short hydrocladial apophysis and containing at least three internodal septa or peg-like perisarcular thickenings: one proximal, one in the apophysis, and a variable number distal. Upper surface of apophysis bearing a small mamelon and axillary and inferior-opposite nematothecae.

Hydrocladia consisting of short basal athecate and longer, terminal thecate internodes; former usually less than half length of the latter, with proximal and distal septa; without nematothecae. Thecate internode with hydrotheca on its upper surface, narrowing beside base of hydrotheca, then expanding and terminating below thecal margin; three nematothecae: one medio-inferior, reaching the base of hydrotheca, and one pair lateral, overtopping thecal margin. Two very distinct internodal septa: at base and at start of distal expansion.

Hydrotheca cup-shaped, almost completely adnate, with smooth, convex abcauline wall, expanding slightly to margin; eversion variable but

especially over end of internode; without intrathecal septum.

Nematothecae all two-chambered and movable: medio-inferior and cauline nematothecae with distal chamber slightly less deep than proximal one; lower on adcauline side but not scoop-like. Lateral nematothecae with deep, narrow distal chamber that is distinctly lower on mesial side.

Only female gonothecae observed. Borne at colony base, slightly annulated, large, ovoid, tapering proximad and truncated distally; aperture broad, with distinct cap or operculum. Male gonotheca described as tapering at both ends, with aperture terminal, small (Gili i Sardà, 1982; Cornelius and Ryland, 1990).

MEASUREMENTS (μm)

Stem: internode length 230–280. Hydrocladia: thecate internode 135–160; athecate internode 25–40. Hydrothecae: abcauline length 130–170; marginal diameter 100–130. Gonotheca (female): length 830–1005; width 640–800.

REMARKS

The female gonotheca does not correspond well with that illustrated by Hincks (1868, Fig. 36, p.305), but agrees with Lister's (1834) original engraving. Also likely to occur around Fiji, having been reported from both New Zealand and Japan, are *Plumularia pulchella* Bale, 1882, and *P. spinulosa* Bale, 1882, which, having a single hydrotheca per hydrocladium, are also referable to *Monothecha* Nutting, used by Cornelius and Ryland (1990). The first species has a concave abcauline thecal wall and two nematothecae in the hydrocladial axil; the second has a distinct adcauline intrathecal septum and the hydrocladium ends in a spine.

OCCURRENCE IN FIJI

On red algae, Ndeumba, LWST, 8 Jul 78 (BM 1984.5.17.44); with female gonothecae, 9 Sep 79 (QM GL10301).

WORLD DISTRIBUTION

Cosmopolitan.

Family AGLAOPHENIIDAE

Millard (1975) maintained Aglaopheniinae as a subfamily of Plumulariidae; others (e.g., Rees and Vervoort, 1987) have done likewise. Other authors (e.g., Bouillon, 1985; Cornelius and Ryland, 1989), whom we have followed, have preferred to confer family status.

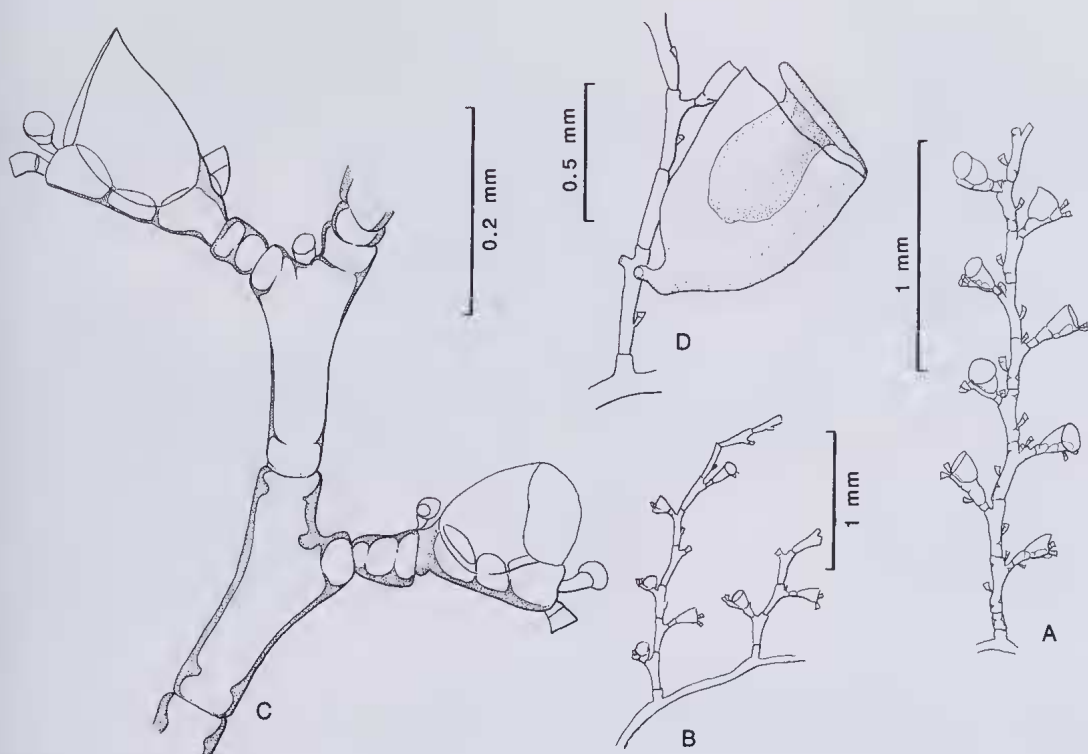


FIG. 9. *Monotheca obliqua*. A, B, parts of colonies. C, stem internodes and hydrocladia. D, female gonotheca. QMGL10301, Ndeumba.

Gymnangium Hincks, 1874

G. eximium (Allman, 1874) (Figs 10–12)

Taxella eximia Allman, 1874: 179

Halicornaria bipinnata Allman, 1876: 279

Gymnangium eximium (Allman, 1874): Stechow, 1923: 236; Vervoort and Vasseur, 1977: 81; Rees and Vervoort, 1987: 156

DESCRIPTION

Colony erect. Stems reaching 110 mm or only 20 mm, depending on growth form (see Variations); lightly polysiphonic; bearing subopposite branches in one plane, these redivided to a secondary or tertiary level. Final branches polysiphonic basally; axial tubes of branches arising from the peripheral tubes of stem (or lower order branch). Axial tube of stem and branches bearing alternate hydrocladia and divided by slightly oblique, indistinct nodes which slope alternately left and right (imparting a vaguely geniculate appearance for the younger parts of the colony).

Basal internodes of stem and branches without

hydrocladia but with regularly-placed median nematothecae. These typically conical, with terminal aperture, facing distad along branch axis. Thereafter all internodes with a midlateral hydrocladial apophysis and two nematothecae: antero-inferior and antero-superior; a minute mamelon on the apophysis. Cauline nematothecae broadly based, widening distally; gutter-like or open with a large aperture on the inner surface; or bifurcated, with tubular or scroll-like processes ending in two terminal apertures at 180° to each other. Antero-inferior nematotheca on the hydrocladial apophysis, directed along hydrocladial axis; antero-superior nematotheca median but with aperture directed away from hydrocladium.

Hydrocladia divided by slightly oblique nodes into regular, straightish internodes, with anterior hydrotheca and two internodal septa: one opposite adcauline intrathecal septum and one at base of lateral nematothecae.

Hydrothecae sigmoid in profile, deep, widening only slightly to margin; abcauline wall variable, but convex in lower adnate region and concave above. A short adcauline intrathecal

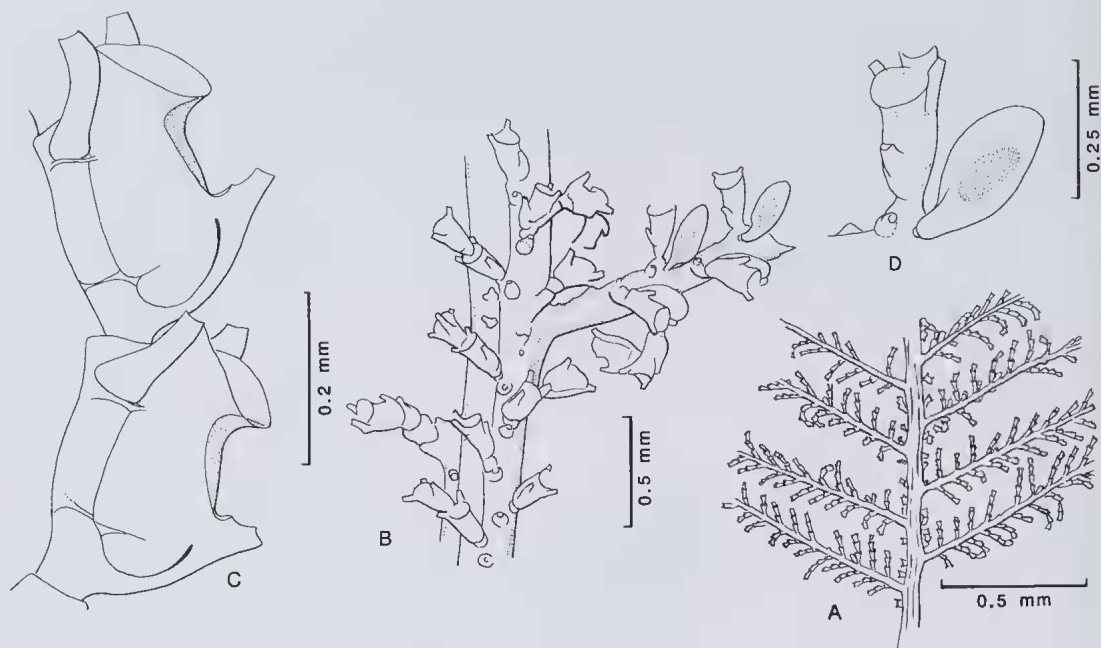


FIG. 10. *Gymnangium eximium*, first form. A, part of colony. B, part of stem and basal portion of hydrocladium. C, hydrothecae and nematothecae. D, gonotheca. QMGL10302, Great Astrolabe Reef.

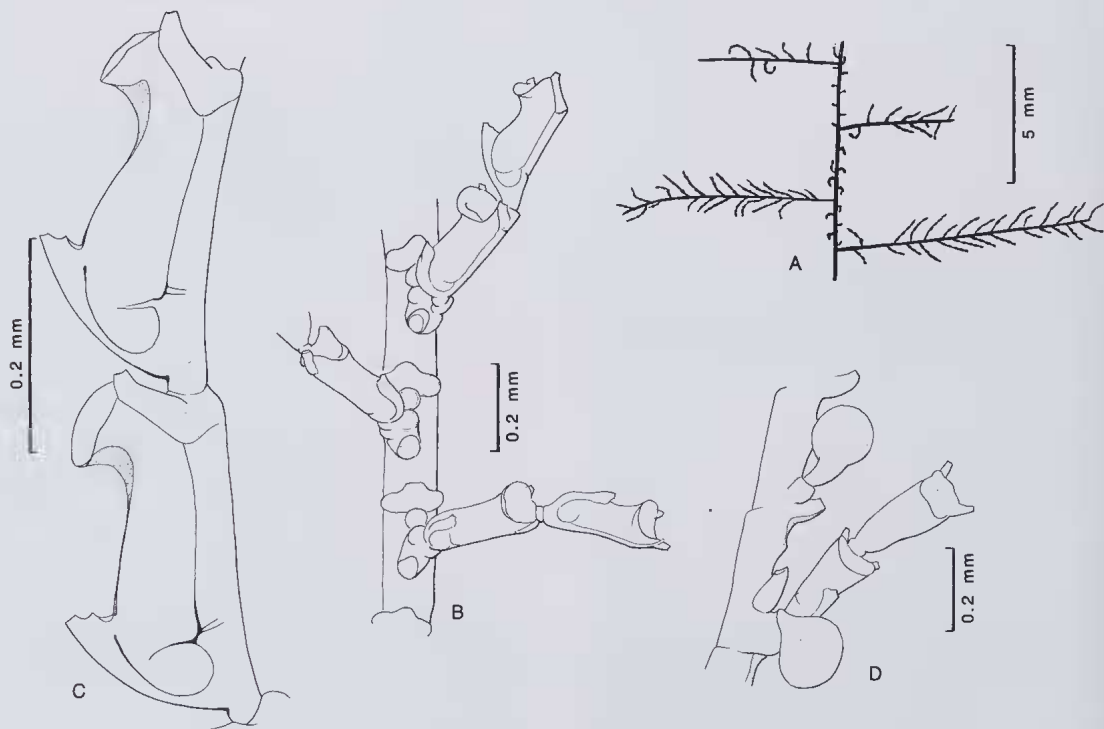


FIG. 11. *Gymnangium eximium*, second form. A, part of colony. B, part of stem and bases of hydrocladia. C, hydrothecae and nematothecae. D, gonotheca. A-C, QMGL10307, Ndeumba; D, QMGL10306, Ndeumba.

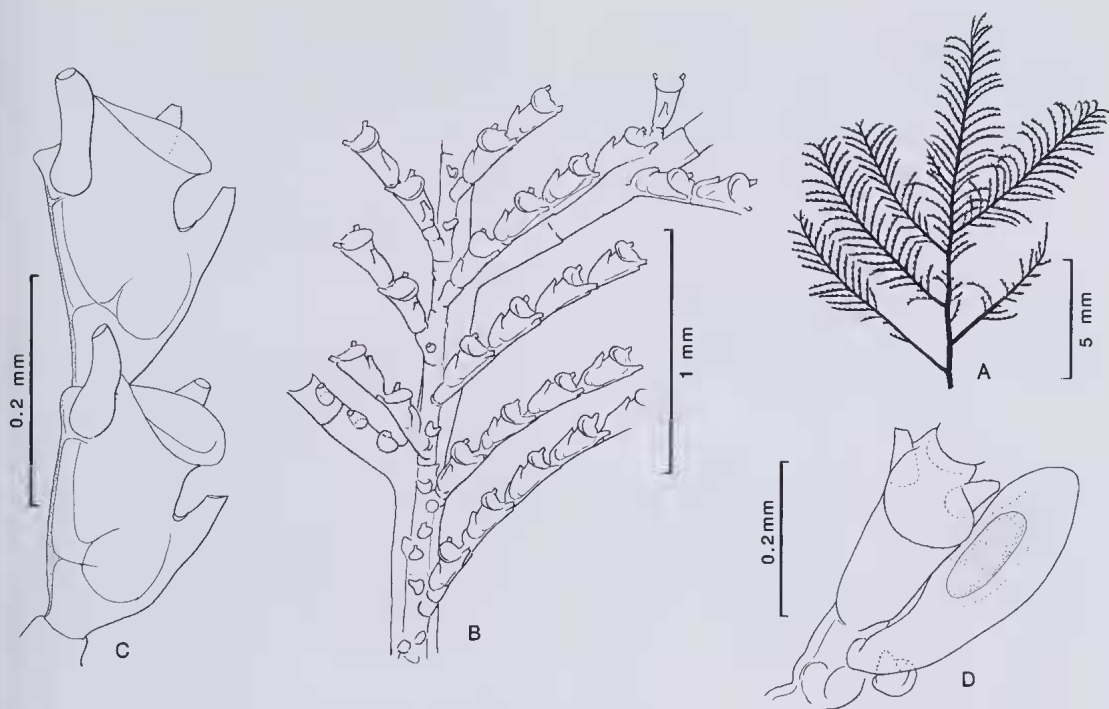


FIG. 12. *Gymnangium eximium*, third form. A, part of stem and hydrocladia. B, part of stem and basal portions of three hydrocladia. C, hydrothecae and nematothecae. D, gonothecae (? immature). A-C, QMGL10304, Great Astrolabe Reef. D, QMGL10305, Yanutha.

septum above the hydropore, perisarcal thickening below margin distinct. Margin facing away from internode at approximately 70° ; smooth or with low-lying, broadly triangular teeth. With three nematothecae: one medio-inferior and two lateral. Medio-inferior nematotheca tubular, adnate to abcauline thecal wall for one-third to one-half of cup height, then free and divergent; with three apertures: terminal, on upper surface at beginning of free part, and opening into hydrotheca near top of adnate part. Lateral nematothecae tubular, with terminal and mesial apertures; overtopping thecal margin, directed antero-distad.

Gonothecae forming double row on anterior surface of branches, one per hydrocladial apophysis; flattened and lens shaped with distinct pedicel.

VARIATIONS

Nodes are usually indistinct on the stem and branch base. Adcauline hydrothecal septa developed to a variable degree, indistinct. Colonies show tendency to reverse the orientation of the stem several times throughout length.

This species occurred in three different colony morphs. The first (Fig. 10), which corresponds most to the type from Ceylon, described by Allman (1874, 1876) as 'attaining a height of upwards of a foot', reaches 110 mm in our material, and has branches of about even length. Its hydrocladia are of two types: those on the stem bear four or fewer (mean three) hydrothecae, those on the branches bear more than four but fewer than seven.

Our second and rarest morph (Fig. 11) differs from the others not only in colony form but also in hydrothecal shape and nematothecal structure. Branches are of the same length throughout, long, widely spaced and orthogonal to the stem. Stem hydrocladia bear never more than three (mean two) hydrothecae, branch hydrocladia typically three or four; the nodes slope posterad (as opposed to anterad). Hydrothecae are similar in basic shape but taller, thinner and less sigmoid: medio-inferior nematothecae short and at 90° to the hydrotheca. Antero-superior cauline nematothecae distinct; broad, flat, adherent to axial tube, trifurcate; branches extending across width of axial tube, each with an aperture. Two

of the apertures opposite, conspicuous and directed laterad on rounded extensions; the third small, directed distad.

The third and commonest morph in our collections (Fig. 12), has flat, round, leaf-like colonies, up to about 20 mm in height and bright yellow when living; the middle branches are the longest, with hydrocladia bearing as many as 20 hydrothecae or more. Vervoort and Vasseur (1977) obtained this form.

The first and second forms were encountered together on the Great Astrolabe Reef. Despite the differences, which all involve features known to be variable, we believe that all three forms may be referred to the same species.

MEASUREMENTS (μm)

Measurements refer to 1st (QM GL10302-3), 2nd (GL10305), and 3rd (GL10306-7) morphs respectively. Stem: internode length 160-250, 250-320, 150-230. Hydrocladium: internode length 175-210, 250-270, 165-220.

Hydrotheca: vertical height, 210-215, 230-250, 200-215; marginal diameter 95-115, 150-180, 90-100; adnate adcauline wall 70-100, 110-123, 70-90; free adcauline wall 55-90, 110-123, 50-70. Medio-inferior nematotheca: length 45-60, 35-50, 50-650. Lateral nematotheca: length 100-120, 90-110, 90-105.

REMARKS

Although *Gymnangium gracilicaule* (Jäderholm, 1903) bears a superficial resemblance to this species and has a similar distribution (Millard, 1975), the abcauline intrathecal septum in *G. eximium* is distinctive.

OCCURRENCE IN FIJI

Found at LWST and below, in gulleys, in windward situations. First and second forms: Herald Pass, leeward Great Astrolabe Reef, 28 m, 24 Jun 78; north of Yanutha reef, Mbengga leeward barrier reef, 4-8 m, 7 Oct 79 (BM 1984.5.17.49-50, 56; QMGL10302-5). Third form: Suva barrier fore reef off Nasese, 0-20 m, 19 Feb 80; Ndeumba, LWST, many occasions; Ngaloa, 15 Jun 79; windward Great Astrolabe Reef, 24 Jun 78, 11 Jul 80 (BM 1984.5.17.47-48, 51; QMGL10306-8). With gonothecae 24 Jun 78, 8 Jul 78, 20 Aug 78, 7 Oct 79, 12 Jul 80. Some colonies from the Great Astrolabe bore *Antennella secundaria* and *Hebella parasitica*.

WORLD DISTRIBUTION

Red Sea, tropical Indian Ocean (Wasini,

Amirante I. (Jarvis, 1922)), Ceylon (Allman, 1876) and French Polynesia.

Gymnangium hians (Busk, 1852) (Fig. 13)

Plumularia hians Busk, 1852: 396

Halicornaria hians (Busk): Billard, 1913: 68

Gymnangium hians (Busk, 1852): Millard, 1975: 444

DESCRIPTION

Colony with erect stems rising from a creeping hydrorhiza. Stem monosiphonic but thick and tough; reaching 150 mm; unbranched; divided by slightly oblique nodes, which slope alternately left and right, into internodes of variable length. Each internode with two or three, alternate, fronto-lateral hydrocladial apophyses, the hydrocladia disposed in a shallow, abfrontally directed V. Basal part of colony without hydrocladial apophyses but with a variable number of low-lying mesial nematothecae. Three nematothecae associated with each apophysis: antero-inferior, antero-superior, and postero-axillary; mamelon absent. Antero-inferior nematotheca small, narrowing distally, not on the apophysis, directed along hydrocladial axis; antero-superior nematotheca widening distally and directed along stem axis; postero-axillary nematotheca weakly bifurcate, projecting away from stem or hydrocladium but with mesial aperture directed along stem axis.

Hydrocladia bearing hydrothecae frontally, divided by slightly oblique, often indistinct, nodes into thecate internodes. Internodes more or less straight, of variable length; without internal septa.

Hydrothecae sac-shaped, rounded, widening to margin. Abcauline septum one-half to two-thirds distance up abcauline wall; exceeding half thecal width, straight at first, curled over at the end. Abcauline wall convex throughout. Hydropore protected by several small spines. Margin at 30-45° to internode, with six lateral cusps. Adcauline and middle pairs prominent, abcauline pair low and rounded, all directed slightly laterally.

Three nematothecae to each hydrotheca: the medio-inferior adnate for entire length of abcauline hydrothecal wall, then free and divergent, curving upward, with concave adthecal surface, pointed at end, upper surface open, no internal opening. Lateral nematothecae saccular, broad-based, narrowing little; gutter-like, with terminal aperture directed dorso-posterad.

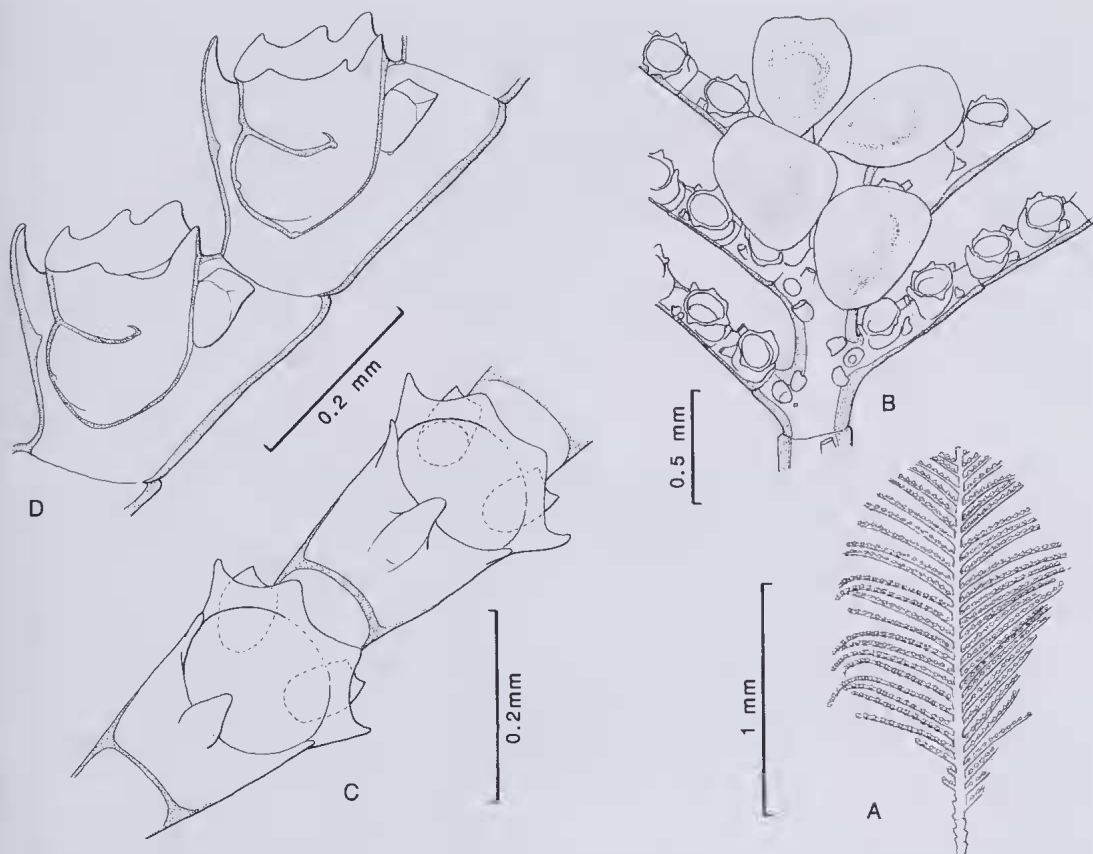


FIG. 13. *Gymnangium hians*. A, part of colony. B, part of stem with gonothecae and bases of hydrocladia. C, D, hydrothecae and nematothecae. QMGL10309, Great Astrolabe Reef.

Cauline nematothecae saccular, variably shaped, broad-based, gutter-like, narrowing little, aperture on inner surface.

Gonothecae in distal half of colony; one per hydrocladial apophysis, forming a double series on the anterior stem surface; smooth, ovoid, truncated distally.

MEASUREMENTS (μm)

Stem: internode length 450–800. Hydrocladium: internode length 50–270. Hydrotheca: vertical height 225–245; marginal diameter 150–180; adnate adcauline wall 210–220; free adcauline wall 30–50. Nematotheca: length of lateral nematotheca 60–80; length of medio-inferior nematotheca 40–60.

VARIATIONS

In tall colonies all hydrocladia are typically of equal length; if shorter, then leaf-shaped (Fig. 13A), with the mid-region hydrocladia the

longest. Cauline nematothecae are very variable in form, often distinctly bifurcate, with two distal perisarcal extensions; never tubular. Lateral nematothecae only rarely overtopping the hydrothecal margin.

REMARKS

Resembles *G. haswelli* (Bale, 1884, as *Halicornaria*) in shape and size, except that Bale's illustrated specimen has a medio-inferior nematotheca which is not gutter-like but tubular, with two apertures: terminal, and on the upper surface at the beginning of the free part. It also resembles *G. speciosa* (Allman, 1877, as *Halicornaria*) in hydro- and gonothecal form; but that species has opposite hydrocladia in the plane of the stem.

OCCURRENCE IN FIJI

Not recorded from any Viti Levu reefs but abundant and conspicuous in the channels at the

windward edge of the Great Astrolabe Reef; with gonothecae 24 Jun 78 (QMGL10309; BM 1984.5.17.52–3), 12 Jul 80 (BM1984.5.17.54); colonies often supporting *Clytia hemisphaerica*, *Hebella dyssymetra*, *Sertularella diaphana delicata*, and *Antennella secundaria*. Also from north tip of Yanutha reef, Mbengga leeward barrier reef, 4–8 m, 7 Oct 79 (BM1984.5.17.55).

WORLD DISTRIBUTION

Tropical and subtropical Indo-Pacific: Red Sea, Africa, East Indies, Torres Strait, Japan, Hawaii, Kermadec Islands; also Caribbean.

Lytocarpia Kirchenpauer, 1872

Lytocarpia Kirchenpauer (1872) has precedence over the more familiar *Thecocarpus* Nutting (1900) and in this respect (though with some misgivings on account of the similarity to *Lytocarpus*) we follow Rees and Vervoort (1987).

Lytocarpia bathyalis sp. nov. (Fig. 14)

HOLOTYPE

QMGL10310–1; BM1988.11.10.5. Found entangled in a prawn trap.

TYPE LOCALITY

Off Suva barrier reef, about 450 m depth. 1978.

DESCRIPTION

Colony tall and delicate, 130 mm, little branched, arising from a tangle of hydrorhizal fibres. Stem polysiphonic, branches lightly polysiphonic basally and monosiphonic distally. Stem and branches bearing long, regularly alternate hydrocladia arising from axial tube; axial tubes of branches arising from the peripheral tubes of stem; divided by indistinct oblique nodes into regular internodes. Each internode with a mid-lateral apophysis, and antero-inferior and antero-axillary nematothecae; a small mamelon on the apophysis. Cauline nematothecae broadly based and either bifurcate or conical; if the latter, then with one terminal aperture which is often confluent and scroll-like with a second, smaller one, at inner base. Antero-inferior nematotheca orientated along the stem axis (not on hydrocladial apophysis), distinctly bifurcate, the apertures directed laterad. Antero-axillary nematotheca conical, aperture directed laterad.

Hydrocladia divided into regular thecate inter-

nodes by indistinct transverse nodes; internodes more or less straight, without septa; the hydrotheca in the upper half of the anterior surface.

Hydrothecae deep, triangular; adcauline wall straight, abcauline wall diverging progressively from base to margin; narrowing below septum. Adcauline intrathecal septum above the hydropore, sigmoidal, of variable length; if complete then inserting two-fifths to one-half way up abcauline wall. Margin directed from internode at 70–80°; with seven marginal cusps. Abcauline cusp more or less fused to the medio-inferior nematotheca, incurved and pointed. Lateral cusps low and rounded, the middle one pointed slightly and sweeping posterad; all upward directed.

Medio-inferior nematotheca adnate to abcauline wall for entire hydrothecal height, then free for a short distance, curving over hydrotheca; bifurcate, scroll-like or slightly tubular to two terminal apertures, with a third at the base of the free part, opening immediately behind the abcauline marginal cusps. Lateral nematothecae tubular, narrowing distad, with two apertures, terminal and mesial; these sometimes confluent and scroll-like, directed antero-distad, overtopping thecal margin.

Corbulae numerous, borne on the stem, parallel to and in the plane of the hydrocladia; open, with pedicel of one hydrotheca-bearing segment followed by up to 40 segments carrying alternate paired ribs. Each rib with proximal hydrotheca (with two lateral but no medio-inferior nematothecae) above the blade base and a single nematotheca below; true perisarc crest absent. Blade narrow, the edges bearing subopposite nematothecae. These long and tubular with terminal and basal apertures inclined along rib axis. Rib indistinctly segmented, typically with one or two nematothecae. Rib internodes with a small mamelon and two opposed, conical nematothecae directed laterad. Gonothecae cordate, somewhat compressed.

MEASUREMENTS (µm)

Internode length: 750–820. Hydrotheca: abcauline length 400–420; adcauline height 430–480; marginal diameter 230–250. Nematotheca length: medio-inferior 80–95; lateral 175–190.

OCCURRENCE IN FIJI

Off Suva barrier reef, about 450 m, with corbulae. 1978 (QMGL10310, 10311).

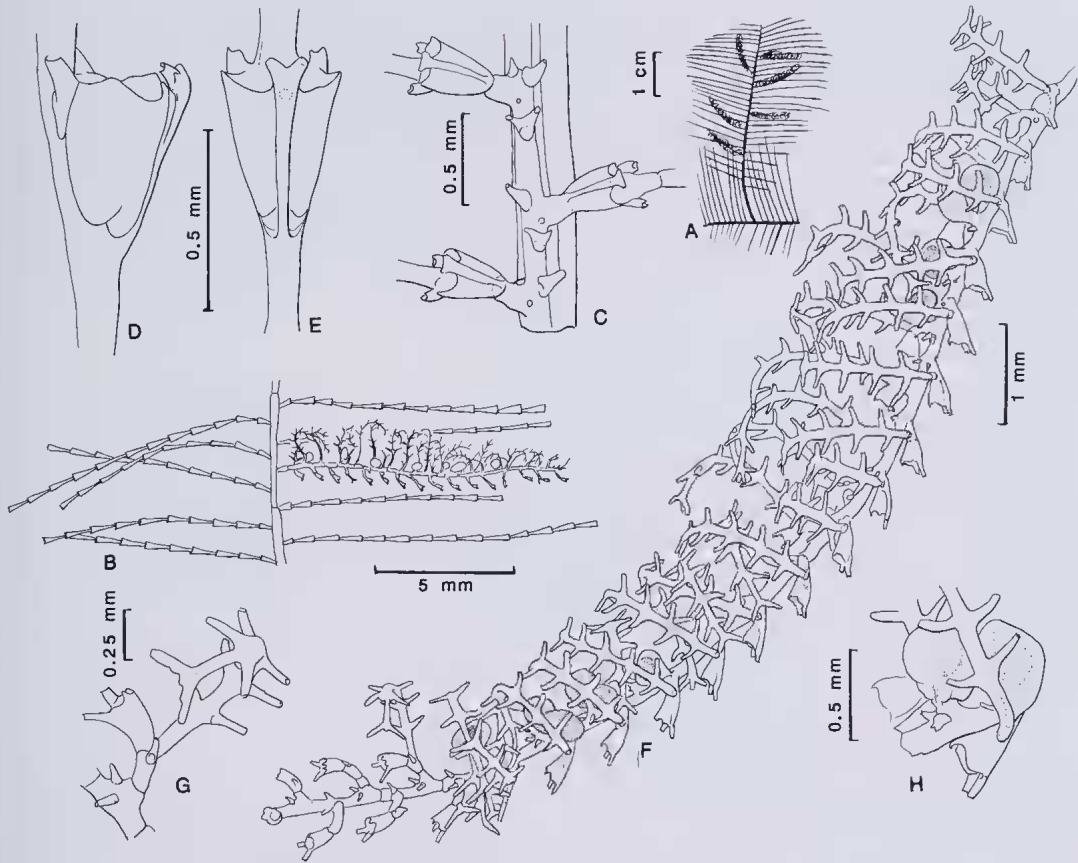


FIG. 14. *Lytocarpia bathyalis* sp. nov. All drawings are of the holotype (slides QMGL10310-1). A, part of main stem and a principal branch. B, part of a branch with hydrocladia and corbula. C, part of branch with bases of three hydrocladia. D, E, hydrotheca and nematothecae. F, phylactocarp. G, bract. H, gonothecae.

***Lytocarpia brevirostris* (Busk, 1852)
(Fig. 15)**

Plumularia brevirostris Busk, 1852: 397

Thecocarpus brevirostris (Busk): Billard, 1913: 89

Thecocarpus brevirostris (Busk, 1852): Millard, 1975: 454

DESCRIPTION

Colony erect. Stems reaching 20 mm, lightly polysiphonic; unbranched or with subopposite branches, usually in one plane, redivided as stem to a secondary or tertiary level. Axial tubes of branches arising from the peripheral tubes of the stem and lower order branches; final branches lightly polysiphonic basally. Stem and branches with alternate hydrocladia from axial tube; this divided by slightly oblique, indistinct nodes, sloping alternately left and right, imparting a slightly geniculate appearance to the younger

parts of the colony. Basal part of stem and branches without hydrocladia; latter with internodes bearing a single nematotheca. Thereafter, all internodes with a mid-lateral hydrocladial apophysis and two nematothecae: antero-inferior and antero-superior; a mamelon on the apophysis. Cauline nematothecae broadly based, widening distally; gutter-like or open with large aperture on inner surface. Sometimes bifurcating distally, with terminal apertures at 180° to each other; then tubular or scroll-like for a variable distance below the apertures. Antero-inferior nematotheca directed along hydrocladial axis; antero-superior nematotheca mesial, directed along internodal axis.

Hydrocladia divided by indistinct oblique nodes into regular thecate internodes. Internodes slightly convex, with a bulge distally; generally

without internodal septa; hydrothecae on anterior surface.

Hydrothecae sigmoid in profile, deep, widening to margin. Abcauline wall convex and thickened in lower region, where adnate to nematotheca; then sharply reflexed. Adcauline intrathecal septum above hydropore, of variable length. Margin facing away from internode at 35–50°, with seven cusps.

Abcauline tooth tall and pointed, may approximate the end of medio-inferior nematotheca owing to curvature of upper abcauline wall; three pairs of pointed and outwardly directed lateral cusps, middle pair broad, triangular. Medio-inferior nematotheca tubular, adnate to abcauline thecal wall for two-fifths to one-half cup height, then free and divergent, curving upward and away from hydrocladial axis; with three apertures: terminal, on upper surface at beginning of free part (these two usually confluent), and opening to hydrotheca near top of adnate part. Lateral nematothecae tubular and narrowing distally, gutter-like; with antero-mesial aperture; overtopping thecal margin, directed postero-laterad.

Corbulae stubby; length 1.5–2.5 times width, much shorter than hydrocladia. Corbula closed, with pedicel of one hydrothecal segment, followed by up to 10 segments carrying alternate paired ribs. Each rib raised proximally as a perisarcal crest supporting a single hydrotheca (with two lateral, but no medio-inferior, nematothecae), then continued as a broad blade with gutter-like nematothecae along outer edge and scattered irregularly on the distal upper surface; inferior edge fused to the superior edge of the preceding rib. Superior edge often with a leaflike outgrowth bearing one nematotheca between hydrotheca and blade. Corbula terminated by up to three complete hydrothecae. Gonothecae delicate, scarcely visible inside the pod-like corbula.

MEASUREMENTS (µm)

Internode length: 270–320. Hydrotheca: free abcauline length 45–80; adnate abcauline length 110–125; adcauline height 220–240; marginal diameter 70–110. Nematotheca length: medio-inferior 70–110; lateral 65–80.

VARIATIONS

Colony leaf-like, with a tendency to reverse stem face several times. Subopposite branches may be in slightly different planes from main stem, angled postero-laterad. Hydrocladial inter-

nodes may have a small incomplete septum opposite the adcauline intrathecal septum.

OCCURRENCE IN FIJI

Yarawa reef, Mba, under boulders, 8 Nov 78 (BM1984.5.17.65); Tailevu Point, on coral rock, 16 Sep 78, 14 Jul 79 (QMGL10314); Thangilai reef, 28 Apr 79 (QMGL10312–3; BM 1984.5.17.66); Ndeumba 18 Mar 79; Great Astrolabe Reef, with *Hebella dyssymetra*, 23 Jun 78 (BM1984.5.17.67), 12 Jul 80.

WORLD DISTRIBUTION

Tropical Indo-west Pacific.

Lytocarpia nicpenni sp. nov. (Figs 16, 17)

HOLOTYPE

QMGL10315; BM1984.5.17.68. Collected by Dr. N. Penn.

PARATYPES

QMGL10316, BM1984.5.17.69 and 70.

TYPE LOCALITY

Makuluva Pass (Sta.33), 15–20m, 2 May 1980.

DESCRIPTION

Colony a well-branched fan, reaching 90 mm. Stem bearing largely alternate branches in one plane, these once or twice redivided in same manner. Stem and primary branches typically lightly polysiphonic basally, monosiphonic distally. Stem and branches with alternate hydrocladia from axial tube. Axial tubes of branches arising from peripheral tubes of the stem; divided by slightly oblique, indistinct nodes into regular internodes. Branch basal internodes without hydrocladial apophyses but with regularly arranged mesial nematothecae, one per internode; thereafter, all internodes bearing a hydrocladial apophysis laterally and two nematothecae, antero-inferior and antero-superior; a large mamelon present on the apophysis. Cauline nematothecae bifurcate to a variable degree; tubular or scroll-like to two terminal apertures, open on inner surface. Antero-inferior nematotheca directed more or less distad along stem axis, with apertures lateral, opposite each other. Antero-superior nematotheca partly on the apophysis and directed more or less distad along stem axis.

Hydrocladia bearing hydrothecae on anterior surface, divided into thecate internodes by indis-

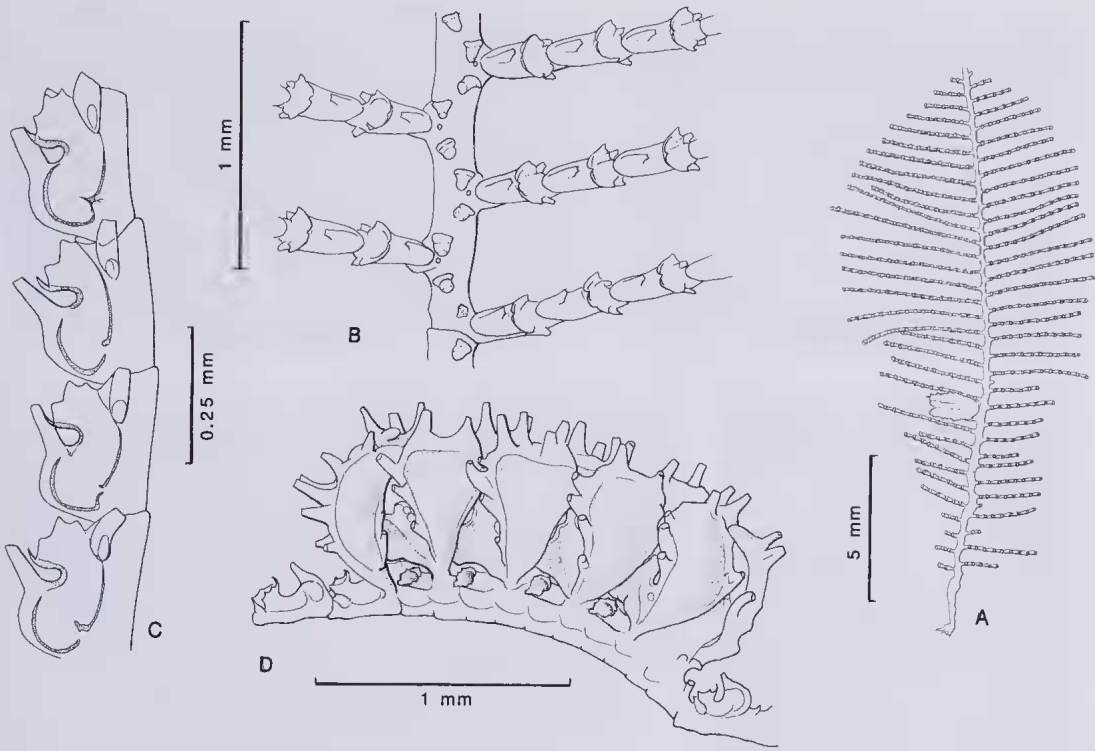


FIG. 15. *Lytocarpia brevirostris*. A, part of colony. B, part of stem and bases of hydrocladia. C, part of hydrocladium in profile. D, corbula. A,B, QMGL10312. C, QMGL10313, Thangilai Reef. D, QMGL10314, Tailevu Point.

tinct transverse nodes; internodes more or less straight, without internodal septa.

Hydrothecae sac-shaped, rarely widening to margin. Abcauline wall thickened and convex where adnate to nematotheca; concave above. Adcauline septum above hydropore of variable length, usually long and sinuous, inserting below the free part of medio-inferior nematotheca. Margin at $55\text{--}70^\circ$ to internode, with nine marginal cusps. Abcauline cusp tall and pointed; remainder progressively rounded and low lying, upward directed, separated by rounded bays.

Medio-inferior nematotheca tubular, adnate to abcauline thecal wall for one-half to two-thirds cup height, then free; with two apertures, terminal, and on upper surface at beginning of free part (the two sometimes confluent); no opening to hydrotheca. Lateral nematothecae tubular and bifurcate, with mesial and two terminal apertures; one part directed anterad and overtopping thecal margin, the other extending posterad across the width of the internode; the latter sometimes absent.

Corbulae numerous on stem and branches, in

same plane as and paralleling the ordinary hydrocladia; open, with pedicel of one hydrothecate segment followed by up to 36 segments carrying alternate paired ribs. Each rib with a small mamelon and two associated nematothecae, one in axil and directed along the corbular axis, the other opposite the rib and directed away from it. Ribs without perisarc crest, with a single nematotheca in angle of blade base and a hydrotheca beyond it; this with a pair of undivided lateral nematothecae but no medio-inferior nematotheca. Blades narrow, bearing subopposite nematothecae on edges (though the first blade unpaired); not contiguous with adjacent ribs (hence open). These nematothecae long and tubular, increasing in length along the blade, oblique to the rib edge and with terminal and basal apertures. Rib indistinctly segmented, typically with one or two pairs of nematothecae per segment. Gonotheca lens-shaped.

MEASUREMENTS (μm)

Internode length 250–280. Hydrotheca: free abcauline length 75–110; adnate abcauline

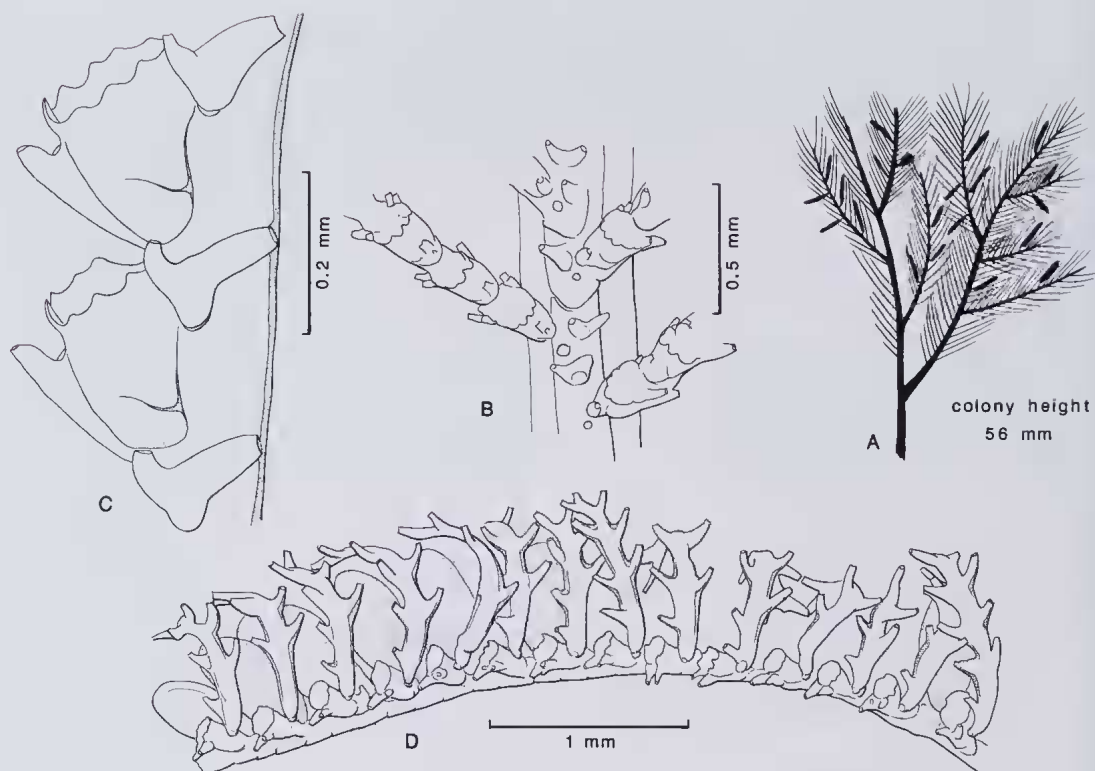


FIG. 16. *Lytocarpia nicpenni* sp.n. All drawings are of the holotype (QMGL10315). A, part of colony. B, part of stem and bases of three hydrocladia. C, hydrothecae and nematothecae in profile. D, corbula.

length 160–185; adcauline length 230–260; marginal diameter 140–170. Nematotheca length: medio-inferior 60–85; lateral (anterior part) 120–150; lateral (posterior part) 95–120.

VARIATIONS

Nodes at branch and colony base very indistinct. Free abcauline wall of hydrotheca showing a variable degree of concavity and height: if short then very concave with abcauline marginal tooth close to medio-inferior nematotheca, if long then straight and roughly parallel with the internode. Antero-superior cauline nematotheca may not be bifurcated but conical, with terminal aperture directed laterad from hydrocladium; on hydrocladia, lateral thecal nematothecae often lacking the posterior element, the pair on any hydrotheca even differing in this respect. Hydrothecae rarely develop along corbula ribs. A second corbula sometimes arises from the rib of an existing, undamaged one.

OCCURRENCE IN FIJI

No intertidal records. Makuluva Pass, 15–20

m, 2 May 80 (holotype); Suva barrier reef, 0–20 m, 19 Feb 81 (BM1984.5.17.69); north tip of Yanutha reef, Mbengga, 15–20 m, 7 Oct 79 (paratype, QMGL10316) and Pratt Reef, Mbengga, 4 m, 3 Nov 79 (BM 1984.5.17.70); all with corbulae.

Lytocarpia phyteuma (Kirchenpauer, 1876) (Figs 18,19)

Aglaophenia phyteuma Kirchenpauer, 1876: 23

Thecocarpos phyteuma (Kirchenpauer, 1876): Mil-
lard and Bouillon, 1973: 95; Vervoort and Vasseur,
1977: 86

DESCRIPTION

Stems arising from creeping hydrorhiza, monosiphonic; reaching 60 mm; divided by slightly oblique nodes into regular internodes. Basal internodes of colony without hydrocladia but with irregularly arranged distal nematothecae. Thereafter, each internode with a single lateral hydrocladial apophysis and three nematothecae: antero-inferior, antero-superior, and

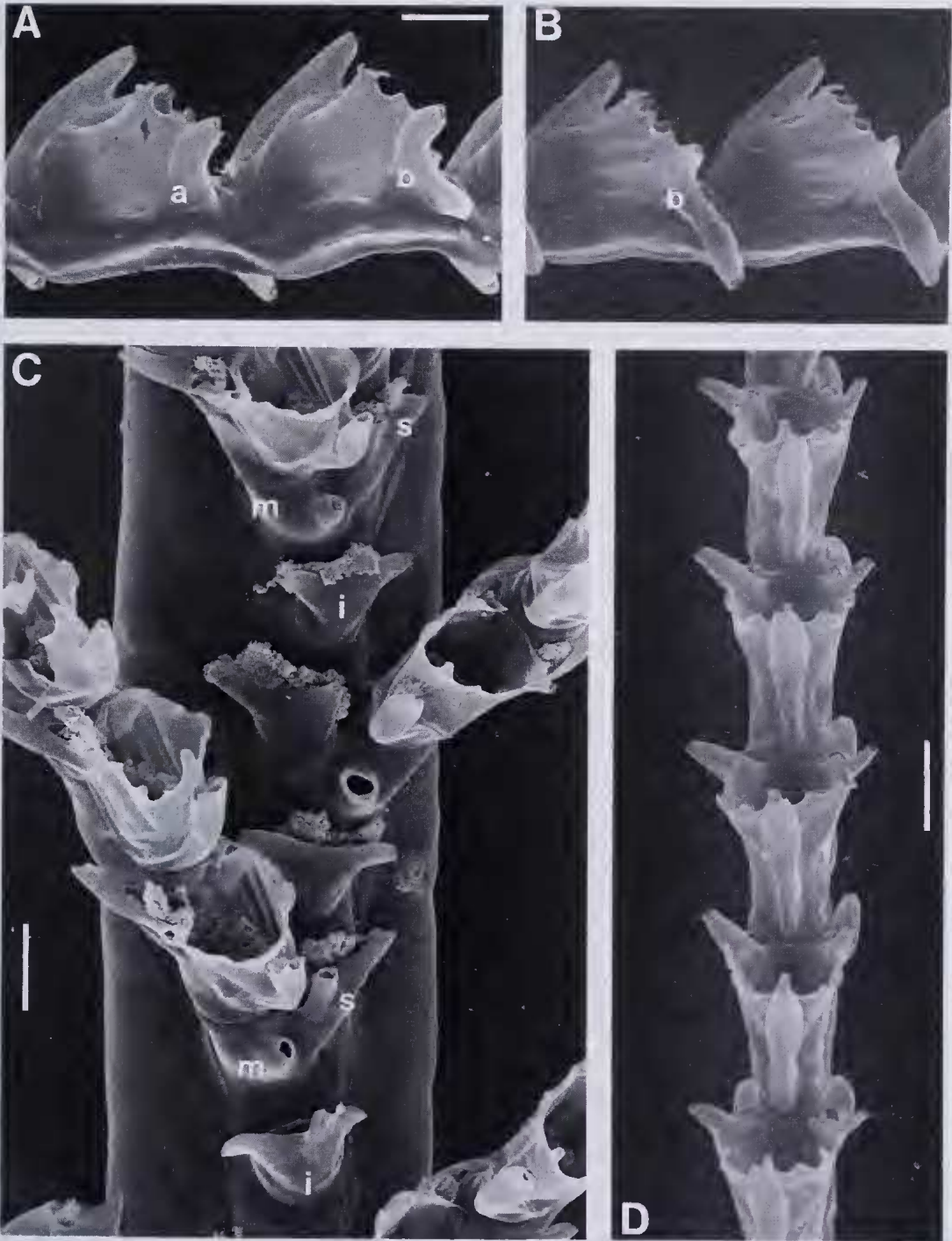


FIG. 17. Scanning electron micrographs of *Lytocarpia nicpenni* sp. nov. A, B, lateral views of hydrothecae. The lateral nematothecae are either bifurcate (b) or represented by only the anterior fork (a). C, part of stem. Between the hydrocladia are an inferior nematotheca (i), a mammelon (m), and a superior nematotheca (s). D, anterior view of hydrothecae. Some lateral nematothecae have both anterior (a) and posterior (p) apertures. Scale bar = 100 μ m. SEMs by Dr M. Fordy.

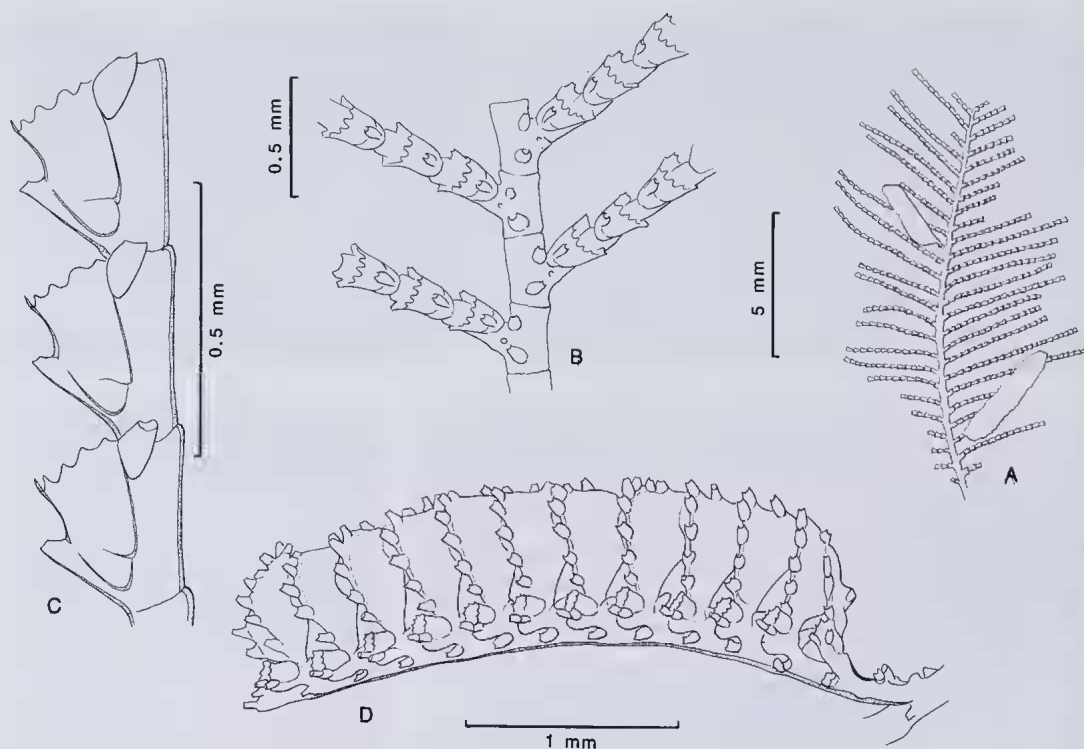


FIG. 18. *Lytocarpia phyteuma*. A, part of colony. B, part of stem and bases of hydrocladia. C, hydrothecae and nematothecae. D, corbula. A, QMGL10319. B,D, QMGL10318, Great Astrolabe Reef. C, QMGL10317, Nukulevu.

postero-axillary; a small mamelon on the apophysis. Cauline nematothecae very variable, all broadly based and with gutter-like aperture on inner surface. Antero-inferior nematotheca median, below apophysis, directed along hydrocladial axis, saccular, wider proximally or distally. Antero-axillary nematotheca narrowing distally, directed along internode axis. Postero-axillary nematotheca sometimes weakly bifurcate, projecting away from internode, with mesial aperture directed along the internode axis.

Hydrocladia alternate, bearing hydrothecae anteriorly, divided by slightly oblique, indistinct nodes into thecate internodes; these more or less straight, without septa.

Hydrothecae variable, sac-shaped, delicate, widening to margin. Abcauline wall thickened, convex in lower adnate region and concave above. Adcauline septum above hydropore of variable length. Margin at 60–80° to internode, with nine marginal cusps. Abcauline, median cusp tall and pointed, remainder progressively more rounded and low lying; directed upward,

separated by rounded bays. With three nematothecae, one medio-inferior and two lateral. Medio-inferior nematotheca tubular, adnate to abcauline thecal wall for one-half to four-fifths cup height, then free, divergent, and gutter-like; also opening to hydrotheca near top of adnate part. Lateral nematothecae likewise tubular and gutter-like, with antero-mesial aperture; overtopping thecal margin, directed posterad.

Corbulae long, about two-thirds length of hydrocladia; closed, with a pedicel of one hydrotheca-bearing segment followed by 20–36 segments bearing alternate paired ribs. Each rib proximally bearing a tall perisarc crest supporting a single hydrotheca (with lateral but no medio-inferior nematothecae); continuing as a broad blade bearing a series of gutter-like nematothecae along the outer/superior edge and having the inner/inferior edge fused to the inner face of the preceding rib. Ribs of the basal pair bear nematothecae on their inferior and superior edges; inferior edge often developed as a leaflike

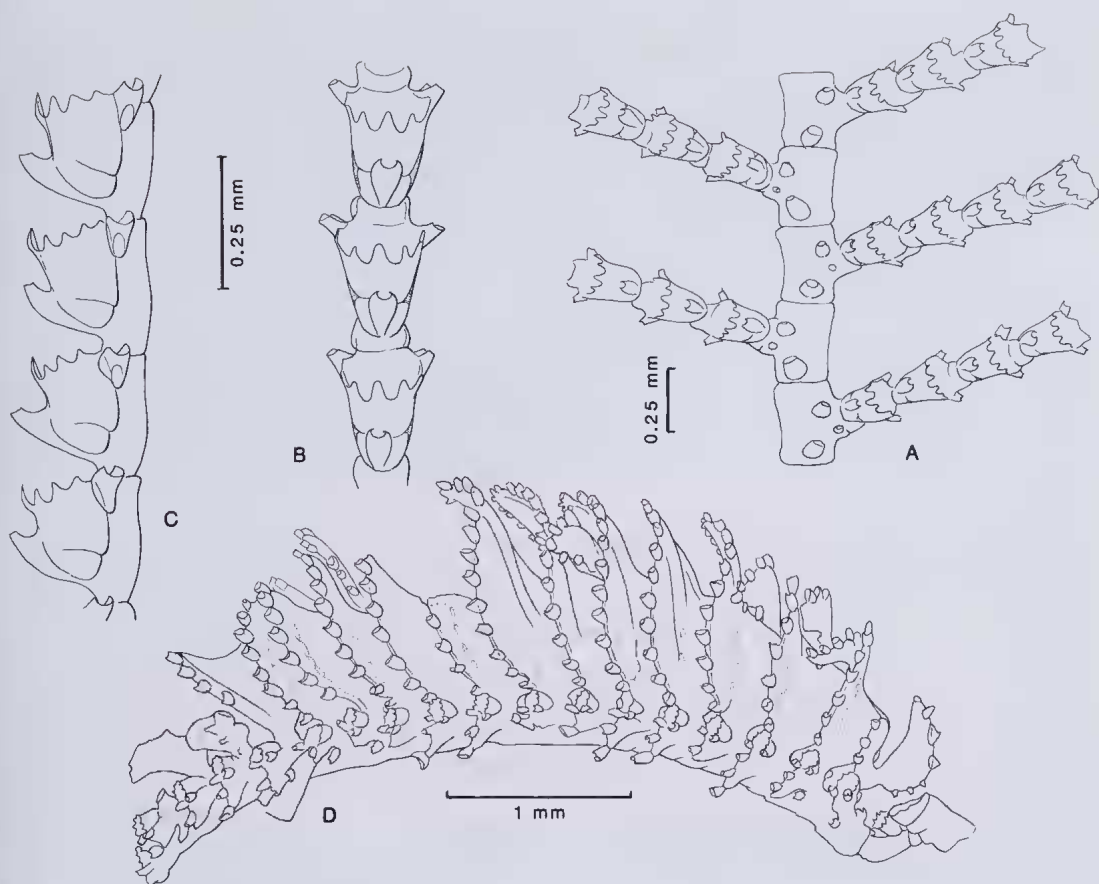


FIG. 19. *Lytocarpia phyteuma* continued. A, part of stem and bases of hydrocladia. B, C, part of hydrocladium. D, corbula. A–C, QMGL10320. B, QMGL10321, Ndeumba.

outgrowth. Nematothecal apertures facing distad along the rib edge.

MEASUREMENTS (μm)

Internode length: 220–300. Hydrotheca: free abcauline length 70–120; adnate abcauline length 115–155; adcauline height 220–240; marginal diameter 110–140. Nematotheca length: medio-inferior 50–65; lateral 95–140.

VARIATIONS

Colony leaf-like in appearance, with hydrocladia either close together or more distant. Sometimes the antero-posterior orientation of the stem is reversed several times. Free abcauline thecal wall of variable length; long, straightish and parallel to internode, or short and concave, the abcauline cusp close to the medio-inferior nematotheca. The greater the concavity, the more acute the marginal angle. Hydrothecal sep-

turn may be complete, below the thecal opening of the medio-inferior nematotheca, or present only as a short extension of the adcauline peg at this level. In the corbula, the basal perisarc crest of each rib may extend beyond its hydrotheca and bear one terminal and up to three disto-medial nematothecae.

OCCURRENCE IN FIJI

Nukulevu, on ascidian, 0.5–2 m, 27 May 79 (QMGL10317; BM 1984.5.17.63); Suva barrier reef, near harbour entrance, 0–13 m, 3 Jun 80 (BM 1984.5.17.64); Ndeumba, gulleys at LWST, 18 Mar 79 (QMGL10320–1; BM 1984.5.17.61); windward Great Astrolabe Reef, 24 Jun 78 (QMGL10318; BM 1984.5.17.60), 11 Jul 80 (QMGL10319; BM 1984.5.17.62), some with *Hebella dyssymetra*; Frigate Pass, Mbengga leeward barrier reef, 3–8 m, with *H.*

dyssymetra; 2 Nov 79. Corbulae present February, March, May, June, July, August.

WORLD DISTRIBUTION

Tropical Indo-west Pacific: Seychelles, Indonesia, Great Barrier Reef, Tonga, Tuvalu, and French Polynesia.

Lytocarpia vitiensis sp. nov. (Figs 20,21)

HOLOTYPE

QMGL10322-4; BM1984.5.17.71. Collected by Dr. N. Penn.

PARATYPE

BM1984.5.17.72

TYPE LOCALITY

Suva Harbour entrance, 12 m (Sta. 25), 21 Nov 79.

DESCRIPTION

Colony a well-branched fan, reaching 60 mm, bearing irregularly alternate branches in one plane, these reduplicated as stem. Stem polysiphonic, branches typically lightly polysiphonic basally and monosiphonic distally. Stem and branches bearing alternate hydrocladia from axial tube. Axial tubes of branches generally arising from the peripheral tubes of the stem; divided by indistinct oblique nodes into regular internodes. Branch basal internodes without hydrocladial apophysis but each with a single mesial nematotheca; thereafter, all internodes with an antero-lateral apophysis and two or three anterior nematothecae: one or two inferior, one superior; and a large mamelon on apophysis. Nematothecae of variable shape and size: broad based and widening distad, gutter-like with aperture on inner surface; usually bifurcate, tubular or scroll-like for a variable length to the terminal apertures; these at 90–180° to each other. Lower antero-inferior nematothecae large, strongly bifurcate, apertures directed laterad, extending whole width of axial tube; orientated distad along stem axis. Upper antero-inferior nematotheca directed along the stem axis, distinctly bifurcate. Antero-superior nematotheca weakly bifurcate, directed distad along stem axis.

Hydrocladia divided into regular thecate internodes by indistinct oblique nodes; internodes more or less straight, without internodal septa; hydrothecae on anterior surface.

Hydrothecae sac-shaped, delicate, not widen-

ing to margin. Abcauline wall long and slightly convex in lower adnate region: short and more or less straight above, slightly thickened. Usually without intrathecal septum. Margin at angle of 50–60° to internode axis, with nine cusps. Abcauline cusp tall and pointed but cusps progressively rounded and low lying posteriorly; directed upward; separated by rounded bays.

Medio-inferior nematotheca tubular, adnate to abcauline hydrothecal wall for one-half to two-thirds cup height, then free, rather straight, with concave upper surface; with three apertures: terminal, on upper surface at beginning of free part (these two usually confluent), and opening into hydrotheca near top of adnate part. Lateral nematothecae tubular and tapering distad, directed postero-distad, and overtopping the thecal margin; with terminal and antero-mesial apertures.

Corbulae numerous, borne on and in the plane of the branches, parallel with the ordinary hydrocladia; open, with pedicel of one hydrothecate segment followed by up to 36 segments carrying alternate paired ribs. Each rib with a small mamelon and two associated nematothecae, one in the axil and directed along the corbular axis, the other opposite the rib and directed away from it. Blade size decreasing distad. Each rib with a single nematotheca in angle of blade base and a hydrotheca beyond it; this with two lateral but no medio-inferior nematothecae; no perisarc crest. Blades narrow, the edges bearing subopposite nematothecae; these long and tubular, oblique to the rib axis, with terminal and basal apertures; their length increasing distad. Rib indistinctly segmented, typically with one or two pairs of nematothecae per segment. Gonothecae lens-shaped.

MEASUREMENTS (µm)

Internode length 230–260. Hydrotheca: free abcauline length 75–95; adnate abcauline length 150–180; adcauline height 220–250; marginal diameter 140–160. Nematotheca length: medio-inferior 65–80; lateral 150–170.

VARIATIONS

Shape of hydrothecal abcauline wall variable, more or less straight throughout and parallel to internode, or distinctly concave below and convex above; adnate region always longer than free part. Some specimens show a weak adcauline intrathecal septum above the hydropore. Lateral marginal cusps of similar size, or the second pair

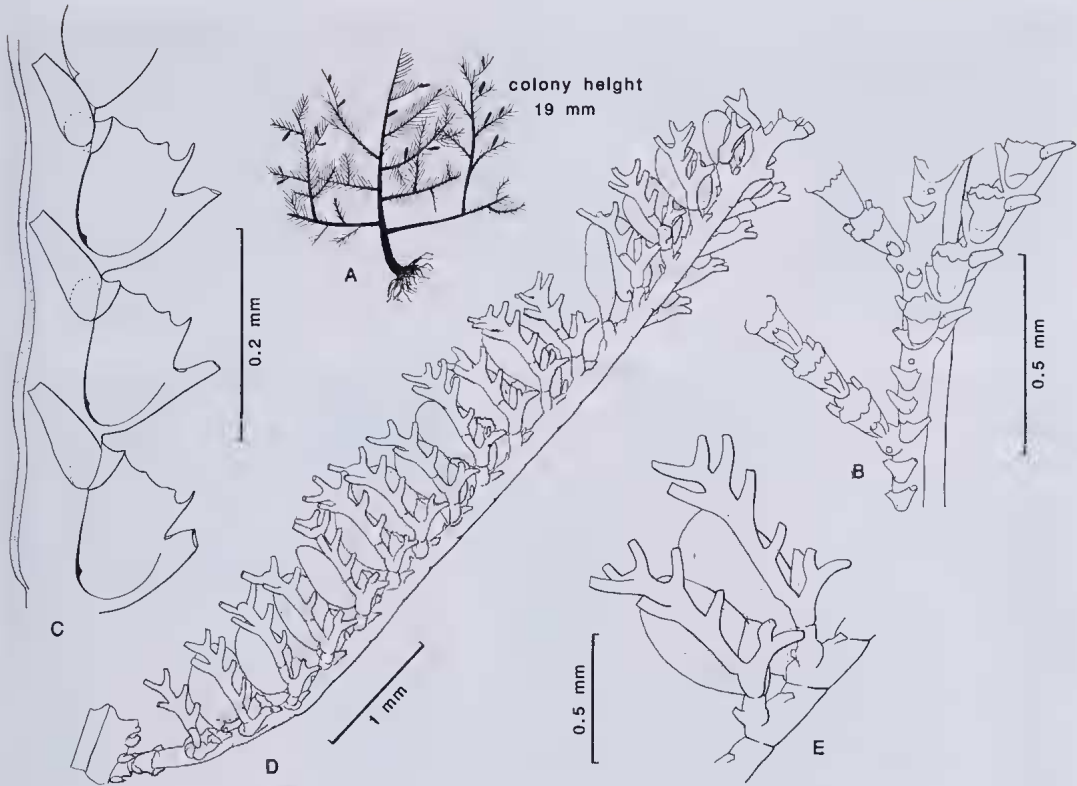


FIG. 20. *Lytocarpia vitiensis* sp. nov. All drawings are of the holotype (slides QMGL10323–4). A, colony. B, part of branch and bases of hydrocladia. C, hydrothecae and nematothecae. D, corbula. E, gonothecae.

from the adcauline side taller. The lower inferior cauline nematothecae are often absent and all cauline nematothecae are variably (or even not) bifurcated.

REMARKS

This species closely resembles *Lytocarpia nicpenni*, both in terms of general colony form and corbula structure, although the colonial fans of the present species seem a little smaller and less dense. The hydrothecae differ mainly in having non-bifurcated lateral nematothecae. However, in the previous species also, hydrothecae at the hydrocladial base frequently bear non-bifurcated lateral nematothecae; but while the single element in *L. nicpenni* is directed anterad, it is directed posterad in *L. vitiensis*. The hydrothecae in *L. nicpenni* have a well developed intrathecal septum, those of *vitiensis* usually do not. The present species also differs from *L. nicpenni* in sometimes having a third nematotheca associated with the hydrocladial apophysis and in the medio-inferior nematotheca opening to the hydrotheca.

OCCURRENCE IN FIJI

Suva harbour entrance, about 12 m, with corbulae, 21 Nov 79 (holotype, QMGL10322–4; BM 1984.5.17.71). Frigate Pass, Mbengga leeward barrier reef, 3–8 m, 3 Nov 79 (BM 1984.5.17.72).

Macrorhynchia Kirchenpauer, 1872

Macrorhynchia Kirchenpauer (1872) is the valid name for the genus more familiarly known as *Lytocarpus* Allman, 1883, see Rees and Vervoort (1987).

Macrorhynchia philippina (Kirchenpauer, 1872) (Fig. 22)

Aglaophenia (*Macrorhynchia*) *Philippina* Kirchenpauer, 1872: 29

Lytocarpus philippinus (Kirchenpauer): Billard, 1913: 78

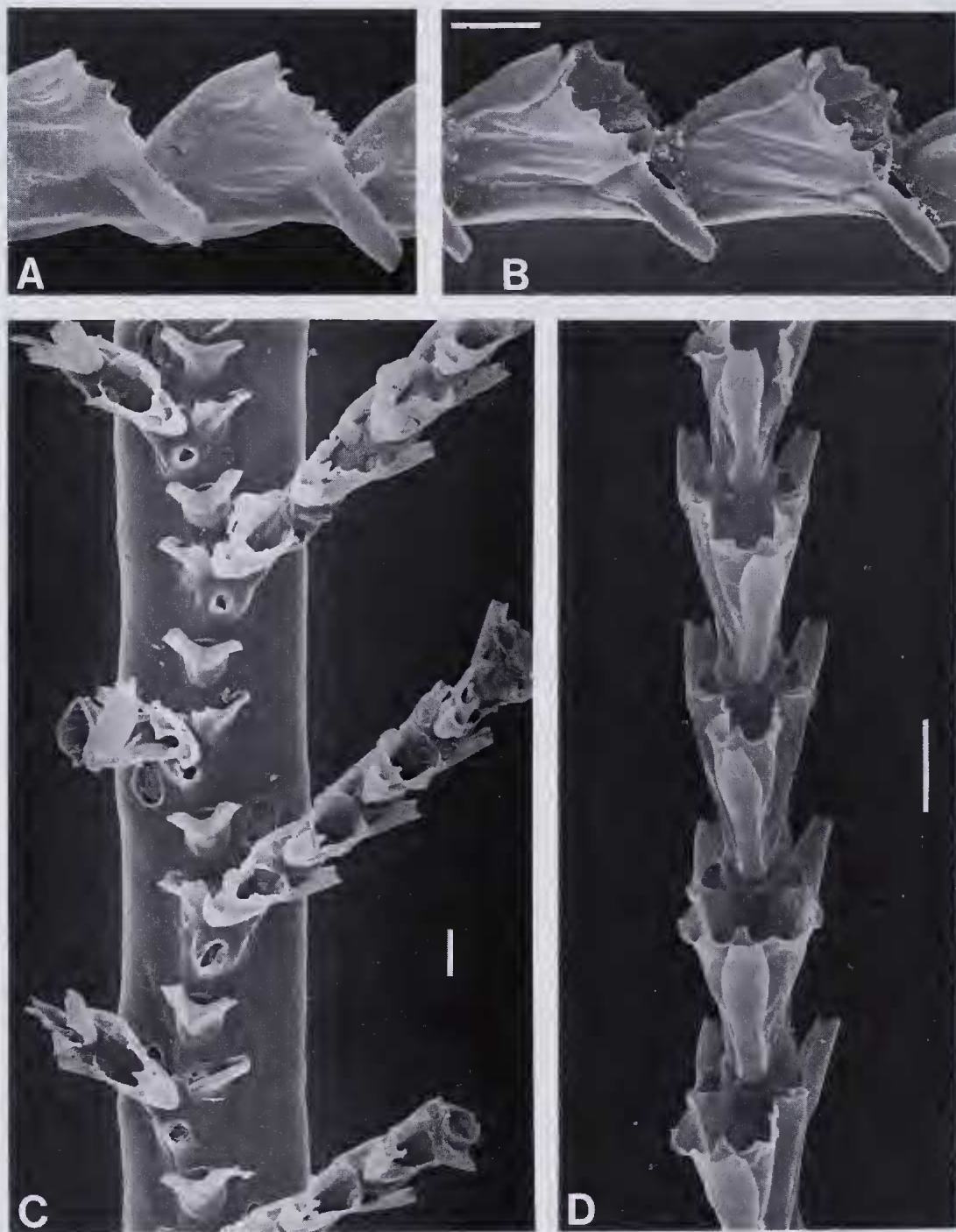


FIG. 21. Scanning electron micrographs of *Lytocarpia vitiensis* sp. nov. A,B, lateral view of hydrothecae. The lateral nematothecae have only a posterior aperture. C, part of stem. Between the hydrocladia are either one or (at the top) two inferior nematothecae (i), a mammelon (m), and a superior nematotheca (s). D, anterior view of hydrothecae. Scale bar = 100 μ m. SEMs by Dr M. Fordy.

Lytocarpus philippinus (Kirchenpauer, 1872): Millard, 1975: 449

Macrorhynchia philippina (Kirchenpauer, 1872): Rees and Vervoort, 1987: 177

DESCRIPTION

Colony reaching 160 mm. Stems bearing irregularly alternate branches in same plane, these redivided to a fifth order. Stem and main branches polysiphonic, final branches typically lightly polysiphonic basally and monosiphonic distally; all bearing alternate hydrocladia from axial tube. Axial tubes of branches arising from peripheral tubes of stem or major branches; divided by oblique nodes into regular internodes. Basal branch internode long, without hydrocladial apophyses but with regularly arranged mesial nematotheca; terminated by a very oblique articulated joint. Thereafter, all internodes with one antero-lateral apophysis and two nematothecae, antero-inferior and antero-axillary; a small mamelon on apophysis. Cauline nematothecae broad-based, conical, with a terminal aperture and a second, smaller one, at inner base, never confluent. Antero-inferior nematotheca on hydrocladial apophysis and directed along its axis; the antero-axillary nematotheca directed disto-laterad. Cauline nematothecae at branch bases typically bifurcate.

Hydrocladia divided into regular thecate internodes by indistinct transverse nodes; internodes more or less straight, with two internodal septa, opposite the small adcauline intrathecal peg and at the base of lateral nematothecae; bearing hydrothecae on anterior surface.

Hydrothecae sigmoid in profile, widening to margin. Abcauline wall convex in adnate region, concave above. Perisarcal thickening below margin distinct, but variably developed; a small intrathecal peg on adcauline wall above the hydropore. Margin facing away from internode at 30–50°, with three cusps. Abcauline cusp very small and resembling a spine; two laterals low-lying with broadly triangular lobes. Medio-inferior nematotheca tubular, adnate to abcauline hydrothecal wall for approximately one-half the cup height; then free, divergent, sometimes upward pointing; with three apertures: terminal, on upper surface at beginning of the free part, and opening to hydrotheca near top of adnate part. Lateral nematothecae tubular, with terminal and mesial apertures; overtopping thecal margin, directed laterad and antero-distad.

Phylactocarps not observed (but described by Millard, 1975).

MEASUREMENTS (μm)

Internode length: 260–300. Hydrotheca: free abcauline length 45–60; adnate abcauline length 120–140; adcauline height 220–250; marginal diameter 100–115. Nematotheca length: medio-inferior 60–80; lateral 100–135.

VARIATIONS

Colony typically spindly, loosely spiralling, characteristically having a dark brown stem and white hydrocladia. Some specimens with very long, clubbed tendrils arising from the end of hydrocladia. Upper abcauline wall of hydrotheca variably concave, hence angle between the internode and the thecal margin also variable.

OCCURRENCE IN FIJI

Common along the fore-reef at Ndeumba, 0–2 m, many collections but never with phylactocarps (QMGL10326–10328; BM1984.5.17.58,59).

WORLD DISTRIBUTION

Pantropical.

Macrorhynchia phoenicea (Busk, 1852) (Fig. 23)

Plumularia phoenicea Busk, 1852: 398

Aglaophenia phoenicea Busk: Bale, 1884: 159

Lytocarpus phoeniceus (Busk): Billard, 1913: 74

Macrorhynchia phoenicea (Busk): Mammen, 1967: 313

Lytocarpus phoeniceus (Busk, 1852): Millard, 1975: 451

DESCRIPTION

Colony erect; stem polysiphonic, reaching 30 mm; bearing irregularly alternate branches in one plane, these never redivided, lightly fascicled basally. Axial tubes of branches generally arising from peripheral tubes of stem; divided by slightly oblique nodes into regular internodes. Hydrocladia arising from axial tube. Basal internodes of stem and branches without hydrocladial apophyses but with one medial nematotheca per internode; all distal internodes with one apophysis on antero-lateral surface, and antero-inferior and antero-axillary nematothecae; a small mamelon on the apophysis. Cauline nematothecae conical, variably sized, with terminal and smaller mesial apertures; the latter orientated along stem axis. Antero-superior

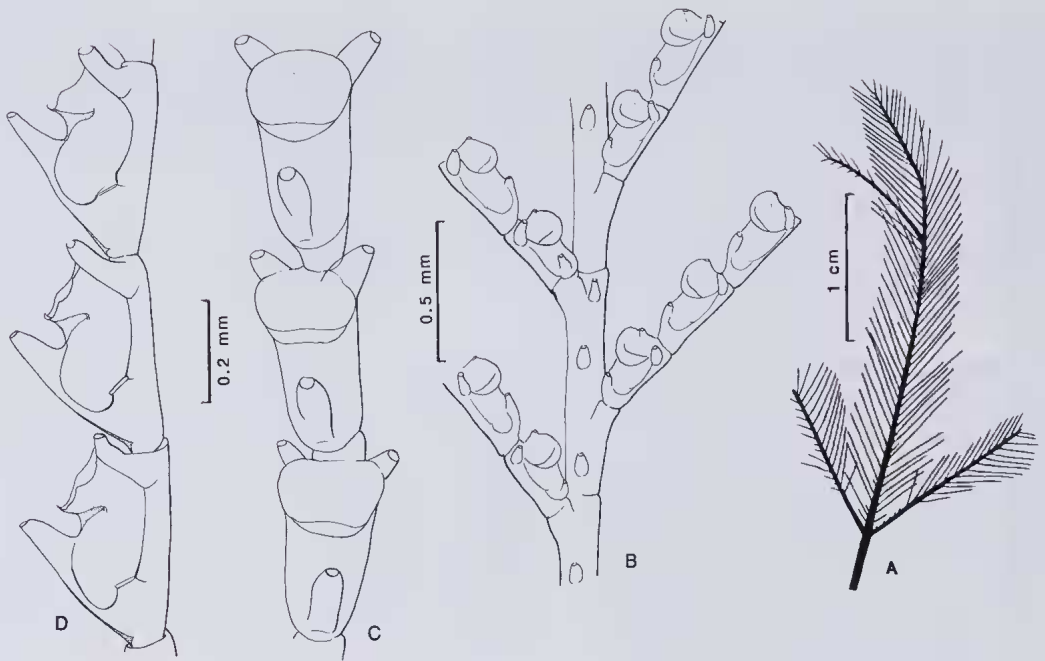


FIG. 22. *Macrorhyncha philippina*. A, part of colony. B, part of stem and bases of hydrocladia. C, D, hydrothecae and nematothecae. A, QMGL10328, off Magnetic Island, Queensland. B, QMGL10327, Ndeumba. C, QMGL10325 Lizard Island, Queensland. D, QMGL10326, Ndeumba.

nematotheca with aperture directed laterad; antero-inferior nematotheca directed distad or along hydrocladial axis.

Hydrocladia divided into regular thecate internodes by oblique nodes; internodes more or less straight, with three septa: one opposite adcauline interthecal septum, one at base of lateral nematothecae, and a faint one in between these; hydrothecae on anterior surface.

Hydrothecae sac-shaped, widening to margin; abcauline septum below margin long, extending for more than half the thecal width, at first straight but distinctly curled over at the end. Abcauline wall thickened, long, parallel to medio-inferior nematotheca for nearly entire lower adnate region, then very short and concave above; with a small peg just above the hydropore. Margin broad, facing away from internode at 30–40°; with nine marginal cusps. Abcauline cusp very small and pointed, laterals more or less equal in height, directed out and up.

Medio-inferior nematotheca tubular, adnate to abcauline thecal wall for majority of thecal length, then free and divergent, extending well beyond thecal margin, directed out and distad. Apertures terminal and on upper surface at beginning of free part, without internal opening

to hydrotheca. Lateral nematothecae tubular, long, directed latero-distad and slightly posterad; with two apertures, terminal and mesial.

Phylactocarps comprising a narrow blade with proximal hydrotheca replace every third hydrocladium. Blade divided by slightly oblique nodes into regular 'internodes' bearing two or three long, tubular nematothecae with terminal and basal apertures. 'Internodes' typically with opposite nematothecae on lateral edges, though alternate 'internodes' to the distal end of the blade bear a third, much longer nematotheca on the outer surface. Phylactocarp curled around gonotheca which is lens shaped but not strongly flattened.

MEASUREMENTS (μm)

Internode length: 240–260. Hydrotheca: free abcauline length 20–30; adnate abcauline length 100–115; adcauline height 180–230; marginal diameter 120–160. Nematotheca length: medio-inferior 110–140; lateral 65–75.

VARIATIONS

The second pair of lateral cusps on the hydrothecal margin may be pointed and back-

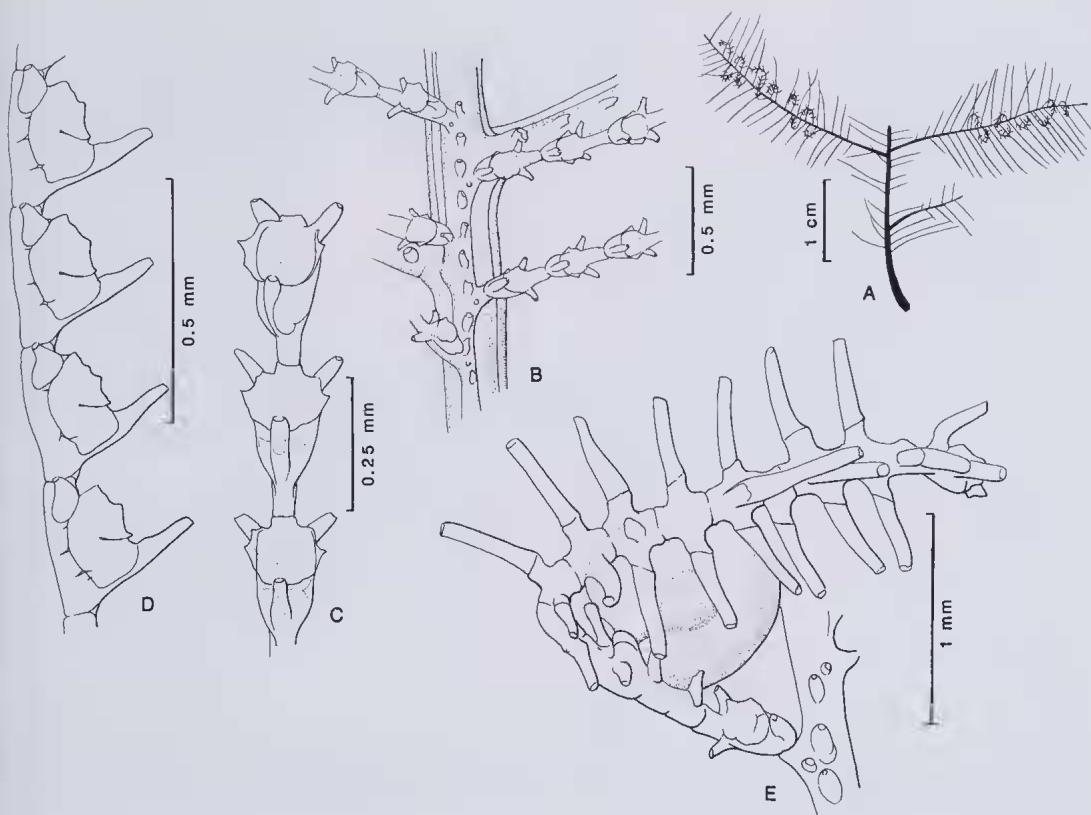


FIG. 23. *Macrorhynchia phoenicea*. A, part of colony. B, part of stem with bases of hydrocladia. C, parts of hydrocladia in profile. D, part of hydrocladium in plan view. E, phylactocarp. QMGL10329, Suva Barrier Reef.

ward sweeping. Those cauline nematothecae on the base of the stem and branches can be sacular, widening distad, and gutter-like.

REMARKS

The hydrothecal shape resembles that illustrated by Bale (1884: from Port Molle) though the long medio-inferior nematotheca is more akin to the variety from Port Darwin. This is a very variable species in terms of hydrothecal shape, length of medio-inferior nematotheca, and orientation of lateral nematothecae. Contrary to the description of Millard (1975), the gonotheca is borne on the second blade segment while the first bears a single nematotheca on its inner surface.

OCCURRENCE IN FIJI

Suva barrier forereef, opposite Nasese, 4–20 m, with phylactocarps, 19 Feb 80 (QM GL10329; BM1984.5.17.57).

WORLD DISTRIBUTION

Tropical Indo-Pacific.

Aglaophenia Lamouroux, 1812

Aglaophenia postdentata Billard, 1913
(Fig. 24)

Aglaophenia postdentata Billard, 1913: 100

Aglaophenia postdentata Billard, 1913: Millard and Bouillon, 1973: 90

DESCRIPTION

Colony with small erect stems arising from creeping hydrorhiza, reaching 8.5 mm. Stems unbranched, unthickened, monosiphonic; bearing alternate, pinnately arranged hydrocladia; divided by slightly oblique nodes into internodes which bear one or two antero-lateral hydrocladial apophyses. Three nematothecae associated with each apophysis: antero-inferior, antero-axillary, and postero-axillary; a small

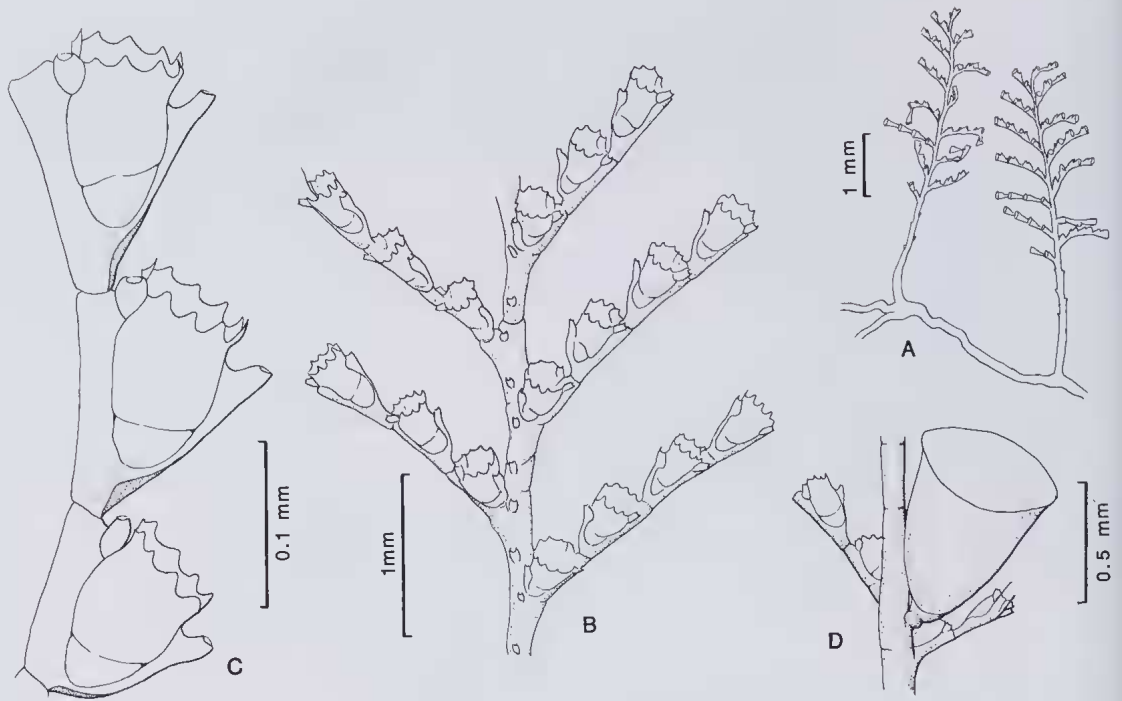


FIG. 24. *Aglaophenia postdentata*. A, part of colony. B, part of stem and bases of hydrocladia. C, hydrothecae with nematothecae in profile. D, associated *Hebella parasitica*. QMGL10330, Great Astrolabe Reef. B–D, QMGL10331, Thangilalai.

mamelon on each apophysis. Proximal part of stem without hydrocladia, of variable length, and with one or two distal internodes articulating with each other and the stem above by means of very oblique, hinge-like nodes. Each of these internodes with one mesial nematotheca. Cauline nematothecae broadly based, conical and gutter-like, with aperture on the inner surface. Inferior nematotheca directed out and along stem axis; both axillary nematothecae directed laterad.

Hydrocladia divided into regular, more or less straight, internodes without internodal septa; hydrothecae on the anterior surface.

Hydrothecae sac-shaped, delicate, widening little to margin. Abcauline wall convex in adnate region, slightly concave above. Adcauline septum above hydropore, of variable length, usually long and bowed up in the middle; often complete. Margin rarely facing away from internode, though this dependent on the degree of concavity of the free portion of abcauline wall; 10 marginal cusps. The ab- and adcauline cusps most prominent; the laterals also pointed, more or less of equal size, directed upward, separated by triangular bays.

Medio-inferior nematotheca gutter-like, adnate to abcauline thecal wall for more than one-half cup height, then free and divergent. No internal opening to the hydrotheca at top of adnate region. Lateral nematothecae entirely on thecal wall, saccular and gutter-like, with antero-mesial aperture; not overtopping thecal margin, directed posterad.

Corbulae not observed (see Vervoort, 1941 or Millard and Bouillon, 1973 for descriptions).

MEASUREMENTS (μm)

Internode length: 250–270. Hydrotheca: free abcauline length 45–95; adnate abcauline length 125–150; adcauline height 180–250; marginal diameter 120–140. Nematotheca length: medio-inferior 35–50; lateral 45–55.

VARIATIONS

Colony thin, with unfascicled stems; may have opposite hydrocladia at stem base. Cauline nodes, sloping alternately left and right, may impart a slightly geniculate appearance to younger parts of the colony. Internodal septum may be present. Free abcauline wall of theca variably concave and may be more or less paral-

lel to hydrocladium. Adcauline marginal cusp variably developed, usually obvious but rarely as prominent as indicated in published descriptions. Some specimens have all the cusps tall and thin, imparting a very different appearance to the hydrothecae.

REMARKS

The similarities between this species and juvenile colonies of *A. pluma* (Linnaeus, 1758) have been discussed by previous authors. Although the posterior marginal cusp is not distinctly demarcated from the laterals in our material, its size and shape provide sufficient evidence to allow recognition of the species.

OCCURRENCE IN FIJI

Great Astrolabe Reef, 12 Jul 80 (QM GL10330). Thangilai reef, 28 Apr 79 (QM GL10331); Suva barrier reef, 29 Mar 79 and, with *Hebella parasitica*, 27 Apr 79; Joske's reef, 18 Sep 78 (BM1984.5.17.46); Ndeumba, with *H. parasitica*, 18 Mar 79.

WORLD DISTRIBUTION

Seychelles, Celebes, Moluccas.

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